INDIA

RUBBER WORLD

OUR
60th YEAR

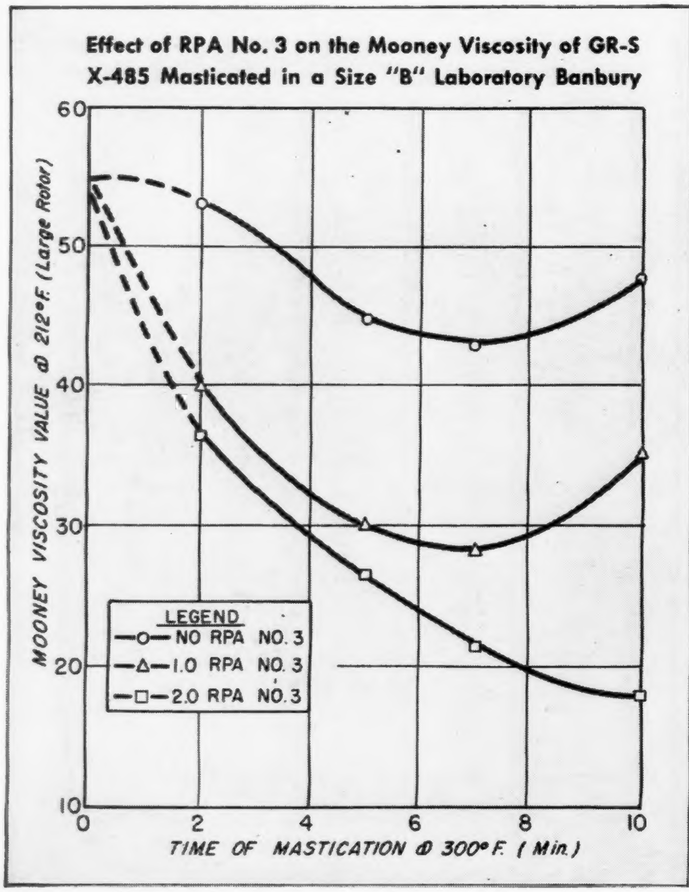
A BILL BROTHERS PUBLICATION

JUNE, 1949

FACTORY-PROVED

for peptizing "low-temperature" GR-S

DU PONT RPA No. 3



FOR IMPROVED PROCESSABILITY

LOWER PROCESSING TEMPERATURES

SMOOTHER EXTRUSION

RPA No. 3 is an excellent peptizer for "low-temperature" GR-S.

The curves in the accompanying graph show the effectiveness of 1.0 and 2.0 parts of RPA No. 3 in reducing the Mooney values of a 41° F. GR-S polymer. And factory runs have shown that this reduction in Mooney values means lower operating temperatures, smoother extrusions and improved processability.

Report BL-231 gives detailed information on the use of RPA No. 3 in compounding and processing "low-temperature" GR-S tire tread stocks. Extra copies are available. Your Du Pont representative will be glad to make recommendations on the use of RPA No. 3 to suit *your* plant conditions. Consult him today. Or write: E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division, Wilmington 98, Delaware.

DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING... THROUGH CHEMISTRY

INDIA RUBBER WORLD, June, 1949, Vol. 120, No. 3 Published Monthly by BILL BROTHERS PUBLISHING CORP., Office of Publication, Orange, Conn., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second Class Matter at the Post Office at Orange, Conn., under the act of March 3, 1879. Subscription United States and Mexico, $3.00 per year; Canada,$4.00; All Other Countries $5.00; Single Copies 35 Cents. Address Mail to New York Office.

TECHNOLOGY DEPARTMENT

Proven time-and-money-saver for rubber compounders!

Good-rite CHEMICALS RESIN 50

REG. U. S. PAT. OFF.

Easy-processing stiffening agent for natural and American rubber products

GOOD-RITE RESIN 50 is the first in a new series of high styrene-butadiene copolymers to be developed by B. F. Goodrich Chemical Company.

Its special purpose is to serve as a stiffening agent. But it offers rubber compounders many extra advantages.

For example, when used in the recommended proportions, Good-rite Resin 50

- **gives higher elongation**
- **improves molding and flow characteristics**
- **saves masterbatching**
- **gives lower brittle point and compression sets**

Resin 50 is made as a white, *free-flowing* powder. Its size is such that it will pass a 100 mesh screen. It can be compounded in a wide range of colors. Added to rubber compounds, it also provides a positive reinforcement and a more readily handled compound—because it acts as a plasticizer at processing temperatures.

Good-rite Resin 50 is recommended for shoe soling compounds, floor tiling—has many other possibilities.

Send for complete information—find out how Good-rite Resin 50 may help you produce better products, easier, at lower cost. Please write Dept. HA-6, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

Hycar
Reg. U. S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

Philippic—*Heated conversation*

Philblack® A—*The HMF black that gives big league performance in the making of rubber goods*

THERE'S no arguing the exceptional mixing and processing characteristics of Philblack A. This fast-curing HMF black imparts remarkably good extrusion and molding qualities . . . gives a smooth, satiny finish after vulcanization.

In tire carcasses Philblack A is especially desired for its excellent heat dissipating properties. It may be blended with Philblack O for lower cost tire treads. Available in bags or in bulk . . . always of uniform quality!

PHILLIPS CHEMICAL COMPANY

PHILBLACK SALES DIVISION

EVANS BUILDING · AKRON 8, OHIO

Phillips 66

Warehouses in Akron, Boston, Chicago and Trenton. West Coast agent: Harwick Standard Chemical Company, Los Angeles. Canadian agent: H. L. Blachford, Ltd., Montreal and Toronto.

9 years continuous operation...without repairs

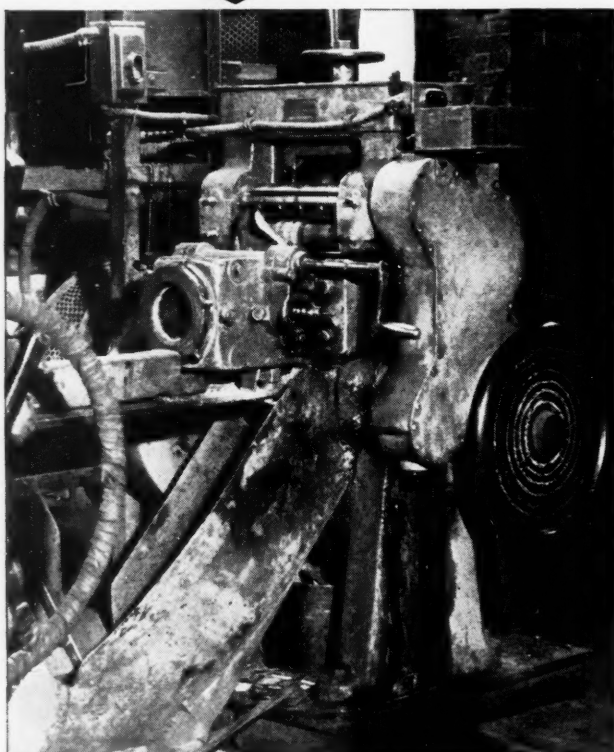
ROBERTSON'S

LEAD SHEATH STRIPPING MACHINE

makes still another satisfied customer

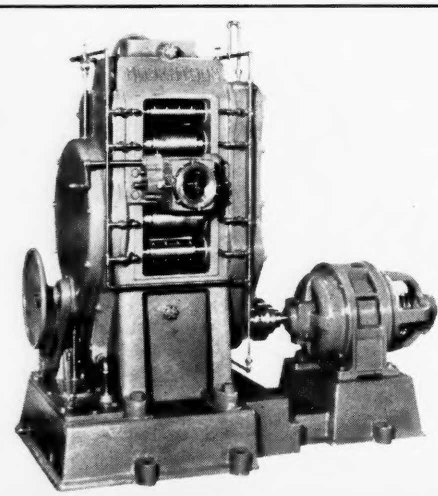
Stripping and reclaiming lead sheath is an important process in the manufacture of vulcanized rubber hose. For this work Whitehead Bros. Rubber Company of Trenton, N. J. installed a Model G "stripper" 9 years ago. Referring to this unit, Whitehead Bros. recently wrote, ". . . we have had it in continuous operation since sometime in 1940 . . . and aside from replacing the knives over the past eight years, there has been no other expense involved in the maintenance of this machine."

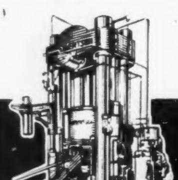
Today, companies using Robertson hose encasing equipment are turning out a sizable amount of the world's rubber hose. Like Whitehead Bros. Rubber Company, these firms have found Robertson machines always efficient . . . always economical to operate.



The above unretouched photo was taken very recently in the plant of Whitehead Bros. Rubber Co. of Trenton, N. J.

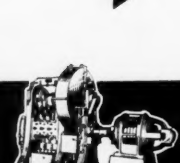
AND THE NEW MODEL IS EVEN BETTER!





Hose Lead Encasing Press

Open Lead Melting Pot



Hydraulic Pump

JOHN Robertson COMPANY INCORPORATED

131 WATER STREET, BROOKLYN 1, NEW YORK

Designers and Builders of all Types of Lead Encasing Machinery

Since 1858

Good-rite ERIE

plus

Good-rite VULTROL

New answer to the "scorch problem" ..in tire tread processing

HERE'S a new and successful accelerator-retarder combination for rubber compounders. It permits use of *all* the advantages of reinforcing furnace blacks in natural rubber tire tread formulations— *without scorching.*

And, it provides these additional advantages:

1. Low heat build-up.
2. Good flex life and high abrasion resistance.
3. Improved resilience and compression set.
4. Easy handling and processing.

Good-rite Erie is an excellent delayed action accelerator. Good-rite Vultrol is a highly effective retarder at processing temperature.

Send for complete information about these widely and successfully used rubber chemicals. Please write Dept. CA-3, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

B. F. Goodrich Chemical Company A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

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CARBON BLACKS

UNITED CARBON COMPANY, INC.

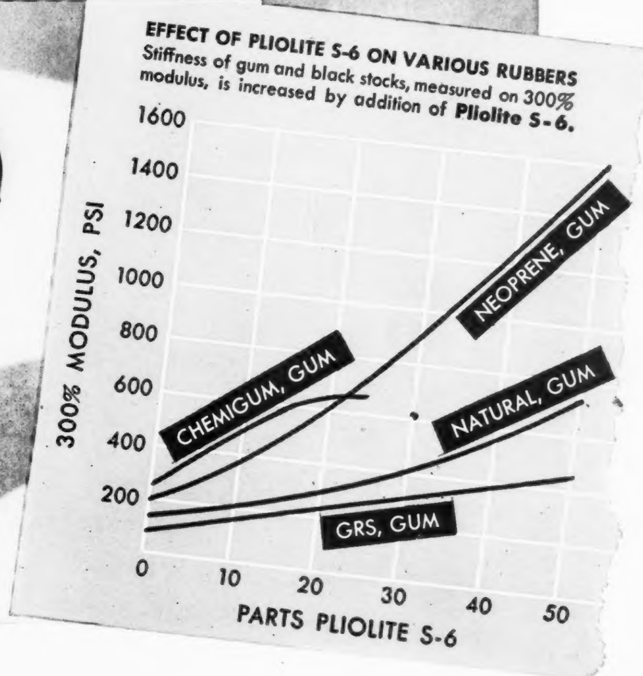
CHARLESTON 27, W. VA.

NEW YORK • AKRON • CHICAGO • BOSTON

for Hardness Stiffness Toughness

use PLIOLITE S-6

PISTOL GRIP takes on added toughness with **Pliolite S-6.**



FOR longer end-use of products and easier fabrication, fortify the natural toughness of rubber with **Pliolite S-6**. The chart shows how effectively **Pliolite S-6** copolymer resins add stiffness to stocks for such parts as this pistol grip, extrusions such as hydraulic and steam hose gaskets, and to a wide range of molded components.

Besides adding stiffness, **Pliolite S-6** also increases hardness and tensile while imparting excellent impact resistance. Because this resin is light in color, it is ideally suited for the reinforcement of light-colored stocks. You will find **Pliolite S-6** well suited for all applications needing a light-color, low-gravity stock of 70 to 100 durometer hardness with good processability and marked moldability.

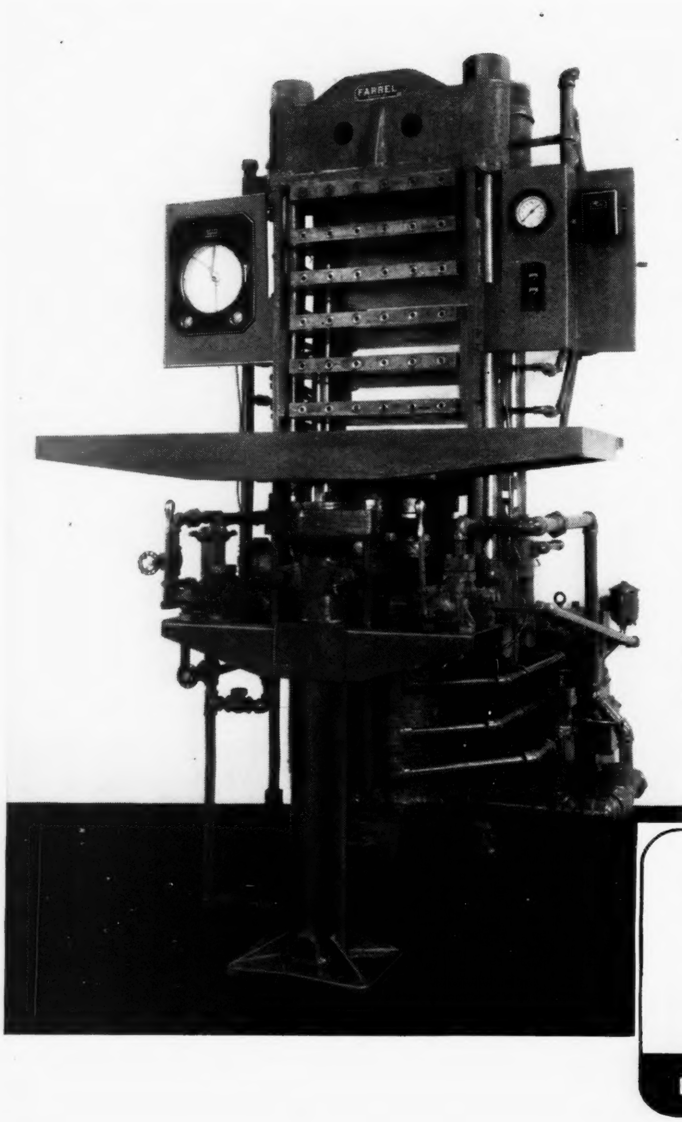
You can get **Pliolite S-6** in powder form for your own mixing, or in master batches. For samples and full details, write Goodyear, Chemical Division, Akron 16, Ohio.

USE PROVED *Products*

GOODYEAR

Pliolite—T. M. The Goodyear Tire & Rubber Company

TAYLOR AUTOMATIC CONTROLS FEATURED ON FARREL-BIRMINGHAM MOLDING PRESS



WE'RE proud to have another equipment manufacturer select Taylor Automatic Control. Here is a heavy-duty hydraulic press, built by the Farrel-Birmingham Company of Ansonia, Conn. Those Taylor instruments on the panels attached to it have taken complete charge of its operation. Here's what happens:

1. Taylor Automatic Blow-Down Timer (right) gives intermittent release of condensation from the platens.

2. Taylor Fulscope Controller (left) automatically maintains even heat in the platens. Also "writes" a permanent, accurate chart record of temperature.

This is one more way Taylor is helping equipment manufacturers to furnish you with more efficient, more dependable rubber-making machinery. Result—you'll turn out products of the highest quality at the lowest possible cost. Always specify "Taylor-Equipped As Usual" when ordering processing equipment. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*

Taylor Instruments

MEAN

ACCURACY FIRST

IN HOME AND INDUSTRY

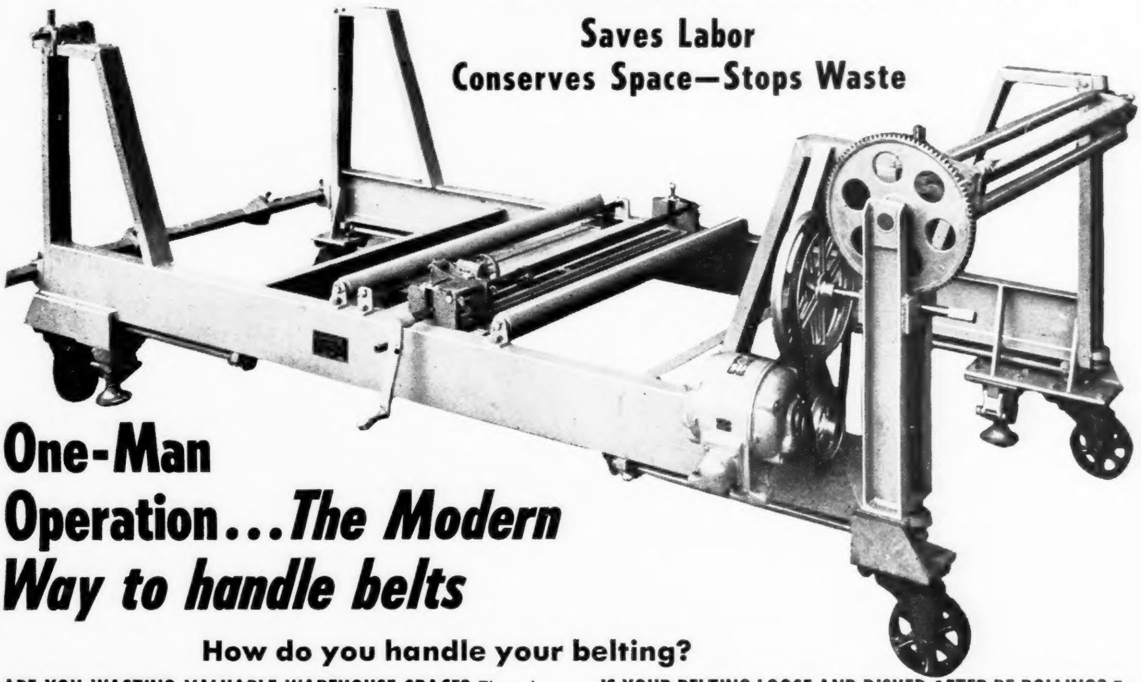
BELTMASTER

TRADE MARK
Reg.U.S.Pat. Ofc.

INSTALLED BY **ANY BELTING MANUFACTURER OR DISTRIBUTOR—*WILL MORE THAN PAY FOR ITSELF***

The New 1949-1950 IMPROVED *Streamlined* BELTMASTER *is better than ever*

Saves Labor
Conserves Space—Stops Waste



One-Man Operation... *The Modern Way to handle belts*

How do you handle your belting?

ARE YOU WASTING VALUABLE WAREHOUSE SPACE? There's never enough space to unroll, measure, cut and re-roll a big belt. BELTMASTER will efficiently cut, slit and re-roll belting in an area of only 12 by 12 ft.

ARE YOU USING TWO TO FOUR MEN TO WRESTLE A BIG BELT? It takes manpower to wrestle a ton or so of belt. BELTMASTER is portable—move it to the belting and then only one man is required to lift, slit, cut, measure and re-roll 10,000 lbs. of belting.

HOW MUCH BELTING DO YOU GIVE AWAY? Hit or miss measurements cost money—cut too short means returns—over cuts add up to lost dollars. BELTMASTER measures, slits, cuts belts to the exact width and length desired.

IS YOUR BELTING LOOSE AND DISHED AFTER RE-ROLLING? For efficient handling both the belt to be shipped and the belting to be returned to stock should be rolled tightly and evenly on the roll. BELTMASTER re-rolls neatly as it slits and measures in one complete operation.

IS YOUR BELTING CUT TRUE? Accurate width and true end cuts are essential! Eliminate expensive mis-cuts. BELTMASTER use guarantees accurate width, thickness, and square end cuts.

CAN YOU KEEP YOUR WHITE BELTING CLEAN? Or is it fingermarked and scuffed from being un-rolled and re-rolled on the warehouse floor? BELTMASTER cuts, slits, and measures off the floor—keeping white belting clean.

Wm. J. Pugh developed the BELTMASTER after 49 years' experience in warehousing and shipping belting. BELTMASTER has demonstrated its utility, economy and all-around superiority in actual use by some of the largest belting manufacturers in the U. S.

Weight capacity—10,000 lbs. of Belting CAPACITY 36" Belt Width, STOCK ONLY ONE BELT WIDTH—SELL ANY DESIRED WIDTH.

WRITE OR WIRE FOR FULL PARTICULARS AND PRICES.

Wm. J. Pugh

RALPHS-PUGH CO., INC.

530 Howard Street, San Francisco 5, California

Indispensable TO YOU IN THE RUBBER INDUSTRY—

Gives Your Products
PROTECTION and SALES APPEAL
at Little Cost!

BEACOFINISH—a unique family of coating materials conceived to give your products greater durability and eye appeal. These highly concentrated wax emulsions that can be diluted with up to four parts of water can be used with the utmost safety and economy.

BEACOFINISH is therefore of four-fold importance to you:—

1. ***It Protects*** your products against their natural enemies—air, sunlight, moisture and excessive handling.
2. ***It Improves*** the appearance of your product for its uniform coating stimulates greater consumer interest.
3. ***It's Economical*** because its high dilution potential (without losing efficiency) allows one gallon to cover 15,000 sq. ft.
4. ***It's Safe*** being a wax in water emulsion, it eliminates the fire and health hazards of volatile-solvent based finishes.

BEACOFINISH can be applied by dipping, sponging, spraying or brushing—dries in about 20 minutes—faster if force-dried—to give a hard protective coating of great elasticity.

BEACOFINISH may be ordered in Neutral or Black, in varying degrees of luster from brilliant to dull. It is so concentrated, from one drum you can obtain potentially up to five drums of superior coating for your products.

CONSULT US—WRITE US TODAY

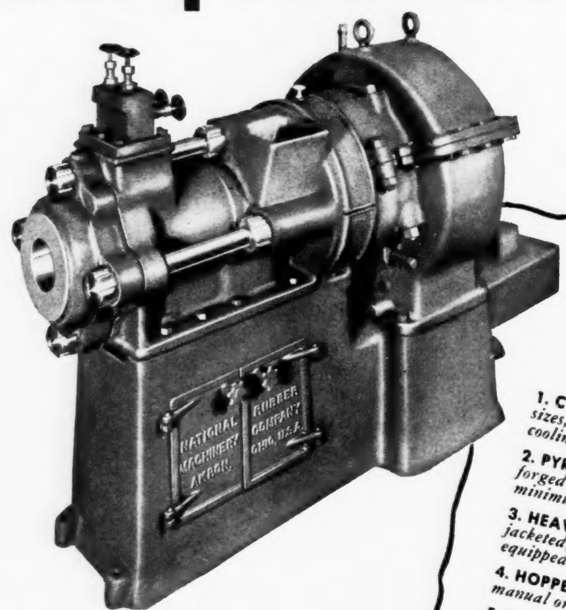
Let us show you how BEACOFINISH can make your products more attractive and saleable—protect them from damage—you from loss—in production and transit!

THE
BEACON
PURITY-UNIFORMITY-DEPENDABILITY
COMPANY
Chemical Manufacturers
97 BICKFORD STREET
BOSTON 30, MASSACHUSETTS

In Canada: PRESCOTT & CO., Reg'd.
774 St. PAUL ST. W., MONTREAL

HERE'S WHY

A new National Tuber will cut your production costs!



COMPARE THESE NRM FEATURES

1. **CYLINDER HEADS** *in all production sizes, available with adapters for water cooling.*
2. **PYRO-HARDENED SCREWS** *of selected forged steel insure maximum durability, minimum wear.*
3. **HEAVY CAST IRON CYLINDERS,** *water jacketed, with removable spiral sleeve equipped with Xaloy bushing.*
4. **HOPPERS,** *conveniently designed for manual or mechanical feeding.*
5. **MANIFOLDS** *are built in and equipped with four valves for heating or cooling cylinder.*
6. **STRESS RODS** *are extra heavy to insure perfect alignment of head and cylinder with gear housing. Precludes breakage.*
7. **THRUST BEARINGS** *are anti-friction type. Oversize throughout for added strength.*
8. **DRIVE GEAR UNITS** *employ case hardened steel herringbone gears. All shafts mounted in heavy duty roller bearings. Sealed, oil tight housing joints . . . self-lubricating system.*

OUTMODED tubers and resulting high-cost production can spell LOSS on your statement, in capital letters.

Never was it more important to replace high-cost, inefficient units with modern *National* tubing equipment.

Production costs are lowered through a more effective use of power, closer control of stock dimensions and lower working temperatures.

A comprehensive bulletin covering the many outstanding features of NRM tubing machines in models ranging from 2″ to 12″ screw diameters, is available now. Write for it—today.

NATIONAL RUBBER MACHINERY CO.

General Offices: AKRON 8, OHIO

Creative Engineering

CASH IN on this Barrel-Head!
with FLINTKOTE ADHESIVES

● Lots of answers here to the question of the correct adhesive.

Flintkote engineers — both research and sales—have solved hundreds of difficult bonding, sealing, coating and production problems . . . have helped numerous industries improve products and cut costs.

Perhaps you need an adhesive to meet ordinary or special requirements. Our extensive facilities are geared to furnish a gallon or a tank car. Hundreds of formulae are available for roll coating, brush or spray applications . . . or our research staff will develop just what you need.

Get in touch with us. Give our experienced staff your product or production problems, so that you, too, may "cash in on this barrel-head."

THE FLINTKOTE COMPANY, *Industrial Products Division*
30 Rockefeller Plaza, New York 20, N. Y.

ATLANTA • BOSTON • CHICAGO HEIGHTS • DETROIT • LOS ANGELES
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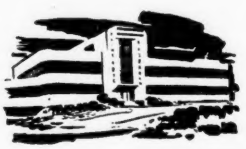
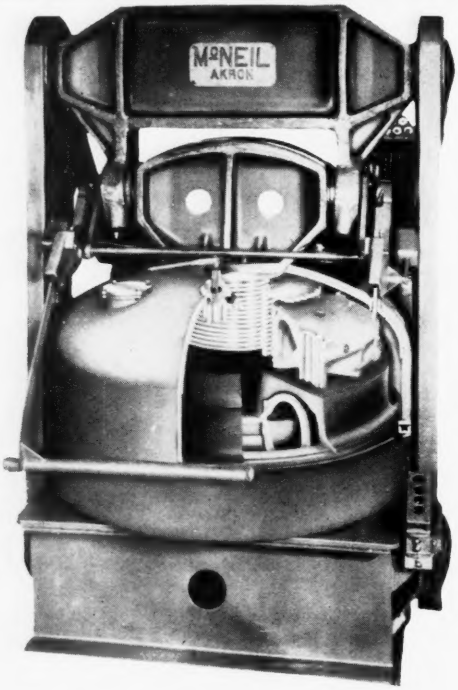


Flintkote's new research laboratory at Whippany, N. J., constantly puts new products and new applications of old products at the service of industry.

FLINTKOTE INDUSTRIAL PRODUCTS

FLINTKOTE *Products for Industry*



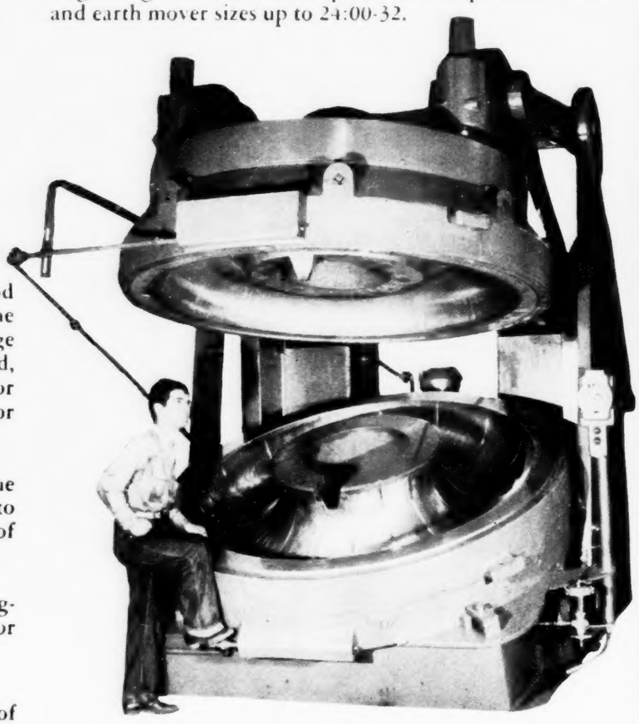
Model 675-65"-18D Single Tire Press

McNEIL

TIRE *and* TUBE CURING PRESSES

IN POPULAR SIZES

Model 400 — 75" — 25, shown below, will handle the larger regular truck sizes, plus farm implement sizes and earth mover sizes up to 24:00-32.



Model 400 — 75" — 25 Tube Press

1

Labor and power saving. Our patented method for stripping any size of tire takes most of the work out of the job. One man can operate a large battery of presses. Very little power is required, as our electrically operated unit requires power for only a few seconds during each cycle, to open or close the press.

2

High production, resulting in lower costs due to almost continuous curing. One-half minute to two minutes for changes, depending upon size of tire being cured.

3

Wide range of flexibility and fast mold changing. Simple and rugged design of mechanism for adjustment to suit mold thickness.

4

Better cures, because of open steam method of curing, plus individual temperature and pressure control, plus cooling if desired. All presses are heavy duty type for high internal pressures.

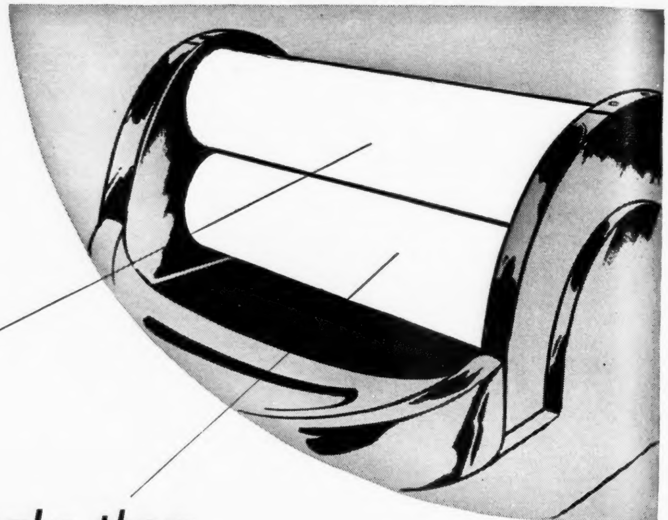
All the experience and engineering skill of the McNEIL organization is at your call to help you increase efficiency and speed while lowering production costs. For tomorrow's production, check with McNEIL today.

MANUFACTURING AGENTS — GREAT BRITAIN—Francis Shaw & Co. Ltd., Manchester, England
AUSTRALIA and NEW ZEALAND—Chas. Ruwolt Proprietary, Ltd., Victoria, Australia.

THE McNEIL MACHINE & ENGINEERING CO.

96 East Crosier St. — Akron 11, Ohio

RUBBER WORKING MACHINERY • INDIVIDUAL CURING EQUIPMENT FOR TIRES, TUBES and MECHANICAL GOODS



make them BRIGHTER and WHITER at low cost...

with TITANOX-RCHT

You can count on TITANOX-RCHT (rutile-calcium pigment) for high brightness because it possesses the maximum brightening power attainable in a composite pigment. Not only does this pigment brighten natural and synthetic rubbers, but it whitens them as well.

Manufacturers of wringer rolls find that balanced compounding to secure proper hardness, compression, and resilience in the roll naturally calls for TITANOX-RCHT, which also contributes brightness and whiteness economically.

There is a specific grade of TITANOX pigment that best meets your needs for whitening or tinting, brightening or opacifying your rubber stocks. Call on our Technical Service Laboratory to help solve any pigmentation problem. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; 104 So. Michigan Ave., Chicago 3, Ill.; 2600 So. Eastern Ave., Los Angeles 22, Calif. Branches in all other principal cities.

® TITANOX

the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

7374

Production Really Rolls with Mt. Vernon Fabrics

Consistent fabric quality can make a great difference in the quality and efficiency of calendering operations. That's why producers of calendered products rate Mt. Vernon fabrics so highly—they are aware of their high degree of uniformity, the result of being made from top grades of cotton under rigid laboratory controls. They know how much Mt. Vernon fabrics contribute to smooth, uninterrupted operations—to quality products.

For fabrics that mean better rubber products, faster production, specify Mt. Vernon.

Mt. Vernon-Woodberry Mills

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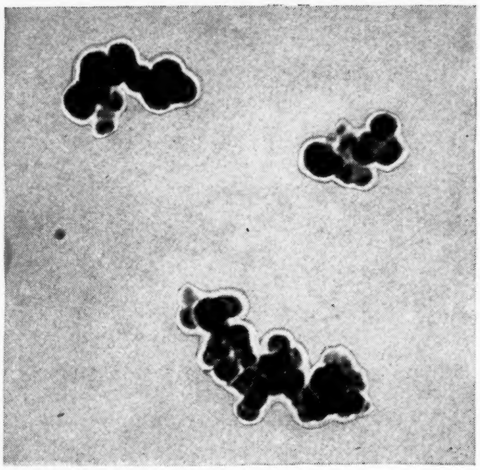
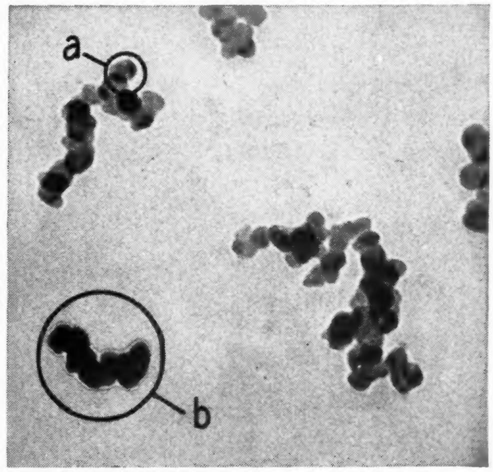
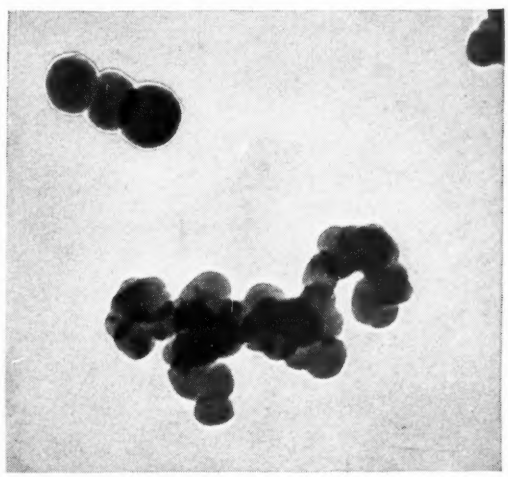
ENGINEERED FOR YOUR PRODUCT
GASTEX



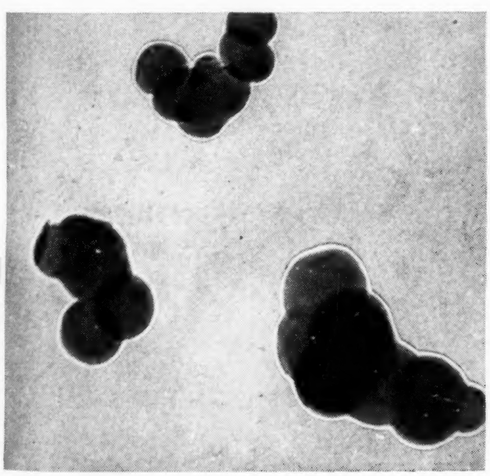
Continental A — Witco No. 1
Average ellipsoidal unit diameter, millimicrons.......27
Specific surface area, square meters per gram.........89
Average shape factor..........................5.9



Continental AA — Witco No. 12
Average ellipsoidal unit diameter, millimicrons.....33
Specific surface area, square meters per gram......70
Average shape factor..........................7.1



Continex HMF
Average ellipsoidal unit diameter, millimicrons.....60
Specific surface area, square meters per gram......36
Average shape factor.........................6.0



Continex SRF
Average ellipsoidal unit diameter, millimicrons......98
Specific surface area, square meters per gram......23
Average shape factor..........................6.4

WITCO CHEMICAL COMPANY
Technical Service Department
295 Madison Avenue, New York 17, N. Y.

Please send me a copy of Technical Service Report CB-1.

Name ____________________

Company ____________________ Position ____________________

Address ____________________ 16

NATIONAL-STANDARD *braided wire braid*

makes steam hose *tougher*

simplifies production

HERE'S a suggestion that might help you improve the strength and life of your hose, while reducing production costs! Simply weigh carefully *all* the advantages you stand to gain by using National-Standard flat braided wire braid in your hose construction.

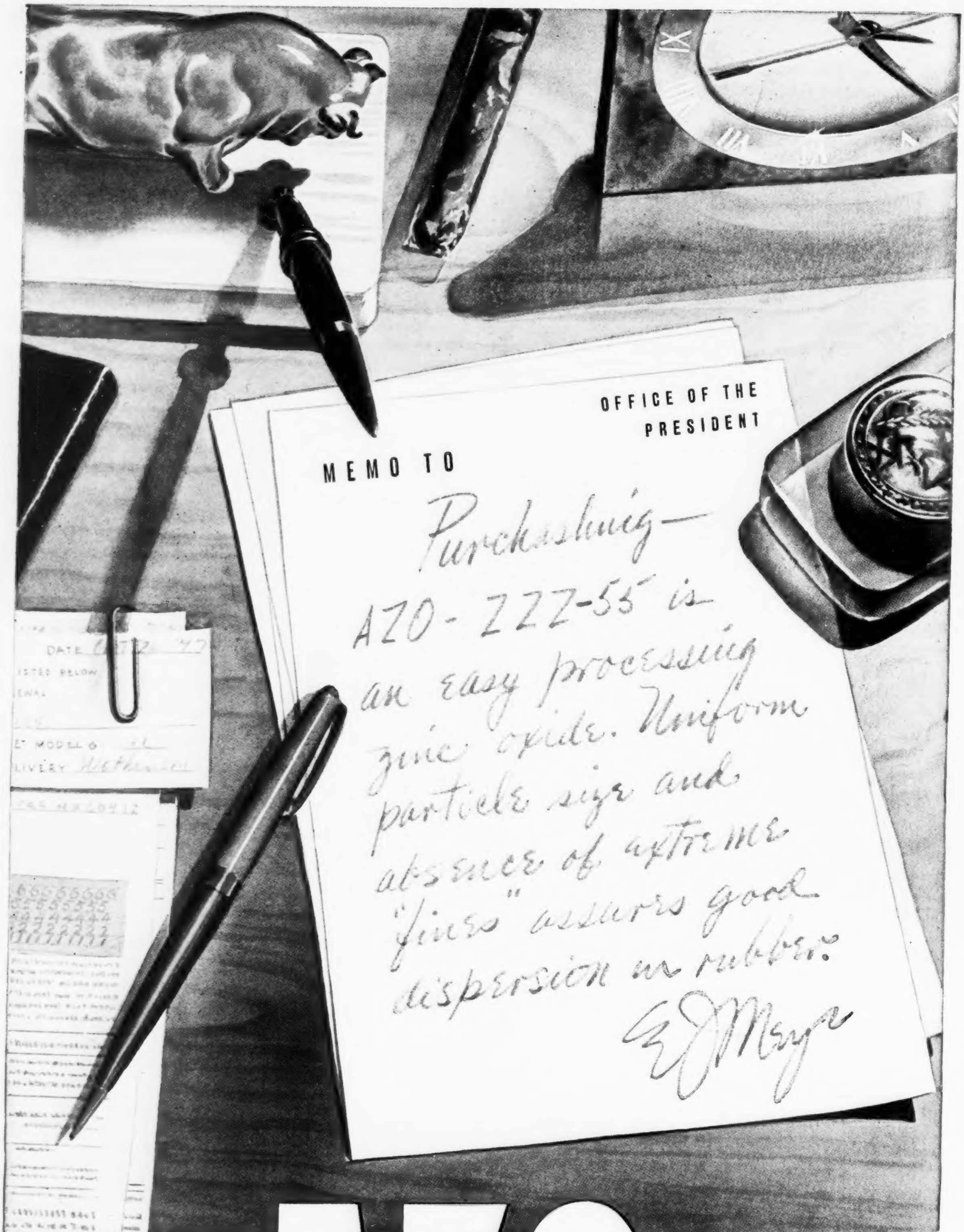
For example, flat braided wire braid eliminates the problem of single wire breaks and uneven loops. You save the time and material normally lost in attempting to equalize wire length and tension for uniform stress distribution. Production is greatly simplified. Quality can be better controlled . . . with fewer seconds and rejects. Moreover, unequaled mechanical adhesion prolongs hose life and eliminates a frequent cause of failure.

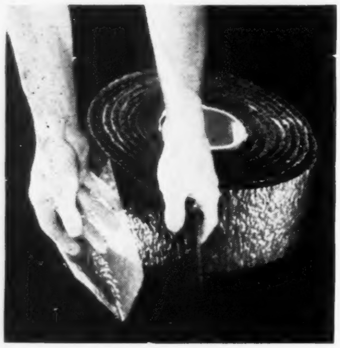
Why not talk it over with a National-Standard engineer? As usual, National-Standard is ready to give you all the help you want . . . all the benefit of over 40 years of intimate experience with wire-in-rubber problems.

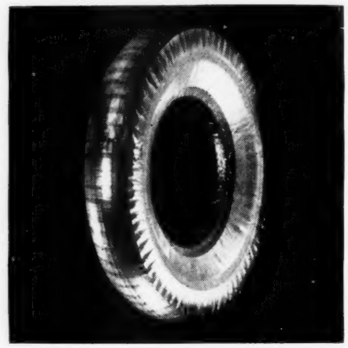
NS NATIONAL-STANDARD *Company* NILES, MICHIGAN

DIVISIONS OF NATIONAL-STANDARD CO.

ATHENIA STEEL . . *Clifton, N. J.*	Flat, High Carbon, Cold Rolled Spring Steel
NATIONAL-STANDARD . . *Niles, Mich.*	Tire Wire, Fabricated Braids and Tape
WAGNER LITHO MACHINERY . . *Jersey City, N. J.*	Lithographing and Special Machinery
WORCESTER WIRE WORKS . . *Worcester, Mass.*	Round Steel Wire, Small Sizes

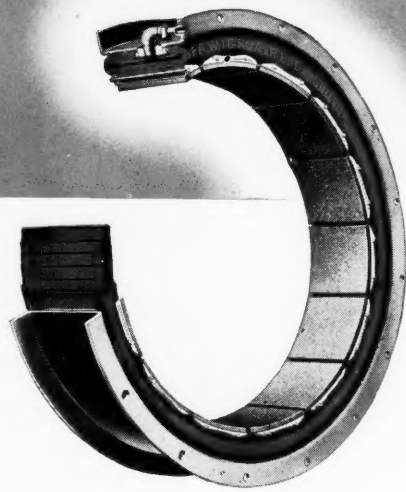

OFFICE OF THE PRESIDENT
MEMO TO
Purchasing—
AZO-ZZZ-55 is an easy processing zinc oxide. Uniform particle size and absence of extreme "fines" assures good dispersion in rubber.



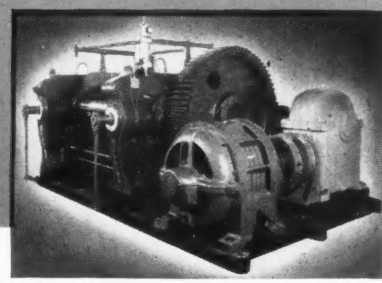


ONLY ONE MOVING PART

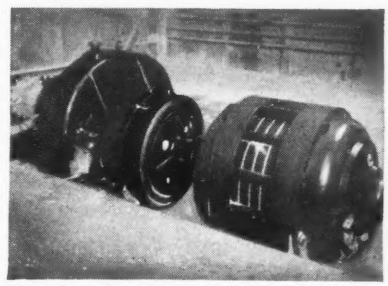
in this Fawick Clutch



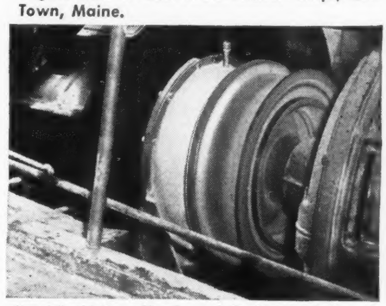
Fawick Airflex Clutch or Brake Type CB



Fawick Airflex Clutch and Brake on Standard No. 7 Heavy-Duty 22" x 22" x 60" Warming Mill by Stewart Bolling & Co., Inc., Cleveland, Ohio.



Fawick Airflex Clutch and Brake on 60" Erie Engine Mill at Old Town Rubber Corp., Old Town, Maine.



Fawick Airflex Clutch and Brake on 2 Farrel Birmingham Mill Lines 18" x 50" at Goodyear Rubber Sundries, Inc., New Haven, Conn.

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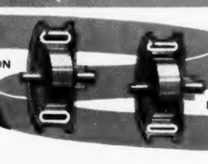

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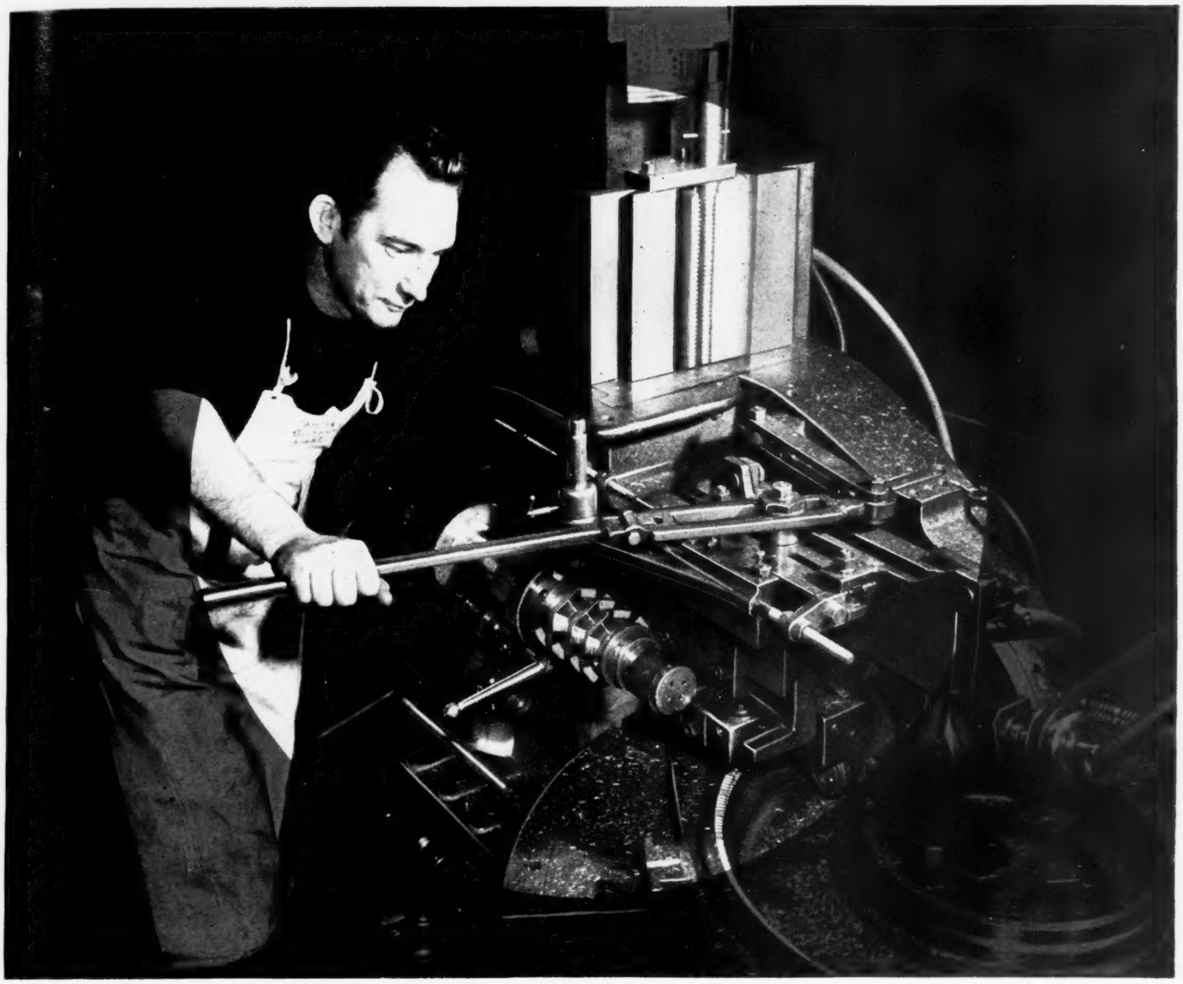

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Modern Calender Processing Equipment[1]

G. V. Kullgren[2]

THE modern precision calender, in combination with associated equipment, is expected to hold gage tolerances defined to 0.0001-inch. One-tenth of one-thousandth of an inch used to be a mythical dimension, and the old rubber calender operator was considered superior if he held product gage within two or three thousandths. Not only were tolerances of 0.001 considered impractical, they could not be measured to that accuracy. Modern instruments make it possible continuously to measure thickness to this decimal, and the modern calendering processes are required to hold product gage within a few tenths. This progress has been made principally in the plastics sheeting industry. Recent surveys and investigation in the rubber industry, however, have shown that product quality can be improved and substantial material savings made by reducing the gaging tolerance in calendering processes. For instance, in the tire industry the new low-pressure tires mounted on the latest model cars have been found extremely sensitive to unbalance or other variations in uniformity. Some of these difficulties are attributed to gage variations in the fabric used in the carcass, and considerable emphasis is being placed on reducing the tolerances in calendering tire fabric.

While these developments are stimulated principally by the need of improved quality of product, there are also economies of a magnitude to justify large expenditures for new equipment. For example, it can be easily shown that if we can reduce the average thickness of double-coated tire fabric by only 0.001-inch by improving the calendering processes, the material saving alone will approximate $1-per-minute per calender. In a large corporation, which will have a number of calenders operating on tire fabrics, the potential savings per year on carcass stocks alone are considerable. One corporation recently made an appropriation of about $500,000 for one calender and accessory equipment which will be installed to replace present old equipment for double-coating tire fabric.

Calendering, in the rubber and plastics industry, consists of forming a sheet of plastic material between two rolls to required thickness and width. The operation very closely resembles an extrusion process. Even in the most advanced design machine the fundamental process is no different than it was in the first calender. The principal improvements to date have been concentrated on stabilizing the axes of the calender rolls and making the roll surface contour such as to produce a uniform sheet. As an example of the changes in machine design in this direction, it is interesting to compare a typical old and new calender.

[1] Presented before the Chicago Rubber Group, Chicago, Ill., Feb. 4, 1949.
[2] Adamson United Co., Akron, O.

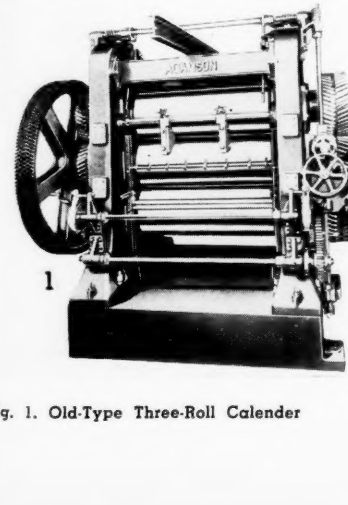


Fig. 1. Old-Type Three-Roll Calender

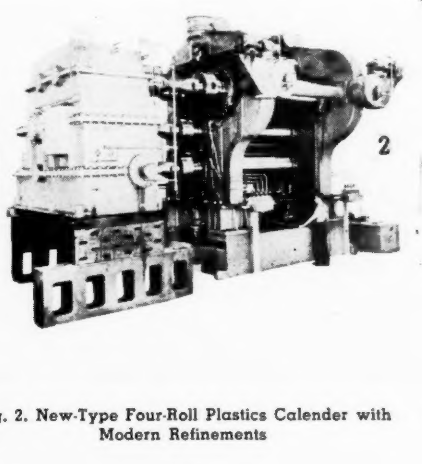


Fig. 2. New-Type Four-Roll Plastics Calender with Modern Refinements

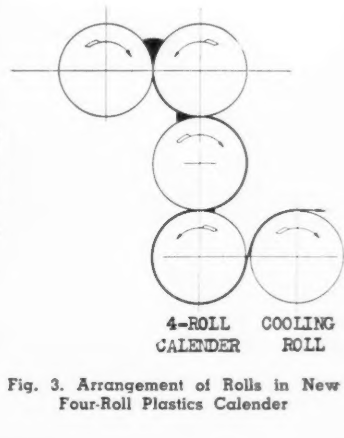


Fig. 3. Arrangement of Rolls in New Four-Roll Plastics Calender

Comparison of Old- *vs.* New-Type Calenders

Figure 1 illustrates a typical three-roll calender, hundreds of which have been in operation in this country for many years. Some, much older than this one, have been running 50 years. Such a machine, in the hands of a skilled and experienced operator, and under favorable conditions, can produce rubber sheeting within a thickness tolerance of ±.0005-inch. Most production tolerances, however, are greater than that, usually in the order of ±.001- or .002-inch. One common method of checking thickness is to weigh each roll of sheeting as it is removed from the calender against a corresponding weight tolerance. This method does not tell you that any particular section of the material is within tolerances, but it does indicate that the total weight of material applied to, say, 300 yards is approximately correct. Further, it does not compare thickness of edge and center of sheet.

Figure 2 shows a modern calender now in production 24 hours a day, seven days a week producing sheeting which must be held within a tolerance of ±.0002-inch. Both the old-style calender and the new modern calender have chilled iron rolls between which the material is extruded to form the sheet. The new machine has refinements in finishing the rolls and in holding them in the proper position to hold the gage within the tolerances mentioned. We might even be permitted to use the expression "super-refinements" when we consider that the rolls are 36 inches in diameter and must form a sheet within these tolerances. Accuracies such as this can only be obtained by also maintaining exact uniformity in stock preparation and feeding and accurate temperature control of the material through the process.

Feeding the Calender

To permit a calender to operate properly it is important that the material be fed to the calender stock bank in a uniform manner, as to temperature, plasticity and volume. A variation in any of these three factors will affect the gage. In plastics calenders, such as the one illustrated, these variables are minimized by using four rolls, which permit the use of three banks so that the final gaging bank can be held closely even if variations occur in the first bank on the calender. This arrangement is illustrated in Figure 3. Even with this arrangement precision calendering is best accomplished if all stock banks in the calender are held uniform. Many operators feed the calender stock bank with a ribbon of stock, which can be held fairly uniform as to temperature and volume. This ribbon is conveyed to the machine on a belt and can be distributed over the feed bank with a wigwag mechanism, or by dividing the feed strip into two parts and feeding them to the bank so that they will load the calender uniformly. Another approach sometimes used in plastics is to feed the calender from an extruder driven by an adjustable speed motor so that the rate of feed can be accurately synchronized with the calender. This extruder can be located above and close to the calender so that the feed is uniform. In most processes it is desirable to keep the calender stock banks as small as possible so that all particles of the material are assured uniform working in the roll bites.

For fabric-coating calenders it is also desirable to control the width, tension, and moisture content of fabric entering the calender. Variation of any of these qualities will affect the penetration of the coating stock into the fabric. The tension on the fabric can be controlled by a pneumatically loaded compensating roll, or by drag rolls with electrically controlled torque regulators. Width can be regulated by use of a simple fabric expander roll. Moisture content can be controlled by either a can drier or air drier located ahead of the calender.

Improvements in Calender Design

The calender itself is basically a machine contrived to support the rolls in proper position for forming the sheet. To meet modern requirements there have been some refinements in the design of new calenders. A brief description of the more important ones might be of interest. The new roll adjustment mechanisms are built with precision gearing. This type of construction is illustrated in Figure 4. In this arrangement the worm and the gear operate on fixed centers, and the adjusting screw is splined to the center of the worm wheel. Figure 5 shows the worm and wheel elements, which are of the "cone" type, with multi-tooth contact. All the gearing is fully enclosed and is splash oil lubricated. Further, the top vertical roll boxes are fitted with hydraulic jacks arranged to force the roll bearing box up against the adjusting screw for the purpose of eliminating all clearance between the adjusting screw and nut. Total gear

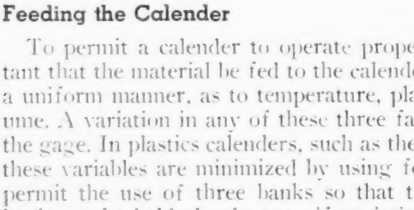


Fig. 4. Precision Gearing Roll Adjustment Mechanism for New Calenders

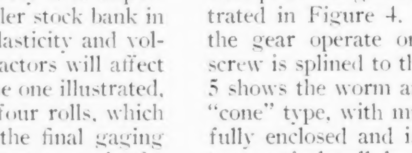


Fig. 6. Inner Roller Bearing Race and Roll Cage on the Neck of Calender Roll

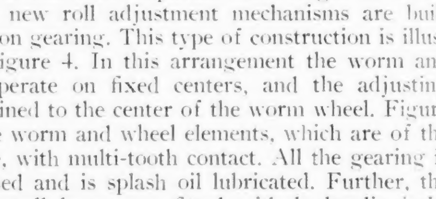


Fig. 5. "Cone"-Type Worm and Wheel of Roll Adjustment Mechanism

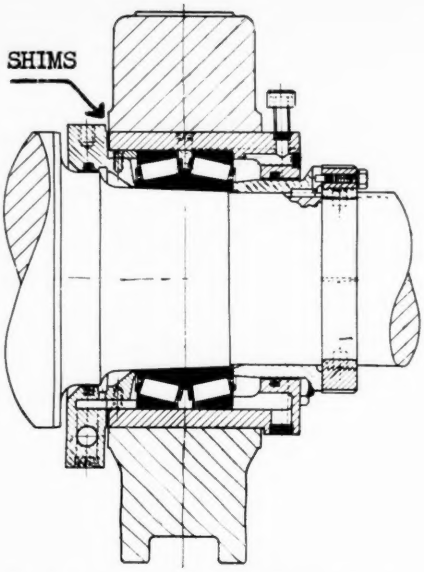


Fig. 7. Cross-Section of Roller Bearing Mounting; Position for Shims under Outer Retaining Ring Shown

ratios as high as 8400 to 1 result in adjustment speeds of approximately 0.015-inch per minute. This slow adjustment speed minimizes over-travel when the calender is used with automatic gage control equipment. Two-speed individual motors—one for each adjusting screw—allow further flexibility in calender operation, with the high speed being used for rough gaging and the low speed for normal precision adjustment or automatic gaging.

There have been improvements in design of roll neck bearings. It is obvious that if a calender roll is accurately to form the sheet to very close tolerances, it is necessary to hold the axes of the roll journals exactly in the required position. In many calenders this has been accomplished by the use of tapered roller bearings, with the bearing clearance adjusted to zero at normal operating conditions. Figure 6 shows a roll with the inner race and roll cage on the neck. Modern roller bearings are available which are built to accuracies which permit grinding of the roll while it is mounted in the bearings. An eccentricity tolerance of less than 0.0003-inch can be maintained when the roll is ground in this manner. A cross-section of a roller bearing mounting is illustrated in Figure 7. This particular arrangement is for a roll in steel mill service, but it will serve to illustrate the preloading arrangement. The double tapered bearing allows the bearing clearance to be adjusted by changing the distance between the two outer bearing races. In the arrangement shown, this change can be effected by adding or subtracting spacer shims under the outer retaining ring. The bearing clearance will vary, of course, depending on the temperature difference between inner and outer races. A bearing adjusted for zero clearance at a normal calender operating temperature of 300° F. will probably have a small clearance when the calender is cold. Owing to the high load-carrying capacity of these bearings it is possible for one adjustment to be suitable for Calender operating temperatures over a range of 100° F. Further, the lubricating oil is circulated at a temperature as close as possible to calender operating temperature, within the limits imposed by oil carbonization and bearing life. This also reduces the temperature differential between inner and outer races.

The roller bearing is particularly useful for this work since it does not operate on an oil film. A bearing adjusted to zero clearance has no "play" between the inner and the outer races. This construction prevents the roll neck axis from changing position in the bearing as a result of variations in oil film or load. It is also possible to obtain good performance with conventional sleeve-type bearings, but the sleeve bearings must have a clearance to permit thermal expansion and provide for oil film. On a production calender this clearance could be 0.020-inch or more. In order to minimize the effect of this clearance it is necessary to use devices such as auxiliary bearing shoes which are arranged to force the roll neck journal toward the position of normal load. This arrangement, while complicated, combined with good oil temperature control equipment, has been successfully used to stabilize roll axis location.

Stock contamination from bearing lubricant has long been a problem in calendering, and in the latest designs much attention has been given to minimizing this difficulty. The use of roller bearings has permitted the use of oil seals which are closely fitted and have been particularly effective in preventing the lubricant from appearing on the surfaces of the roll neck where it could contaminate the stock.

For accurate calendering it is desirable to control the feed stock bank. Some calenders have the stock guides adjustable so that they can be moved in or out from the center of the calender along the roll face. In many of the new calenders this adjustment is made electrically by push-button so that the material coming through the first bite can be easily controlled as to width, as well as gage.

Calender Roll Deflection

One of the most troublesome factors in calendering is roll deflection. As the roll separating forces will change in response to changes in speed, temperature, plasticity of stock, and thickness, the industry has long felt the need of an adjustment to compensate for roll deflection. Such a feature is of particular value where a wide variety of materials must be produced, each with different characteristics which result in different separating forces between the rolls. This condition is usually true where a manufacturer has only one calender on which he must process a variety of products. It is impractical to grind or hone the rolls for each product; so he usually com-

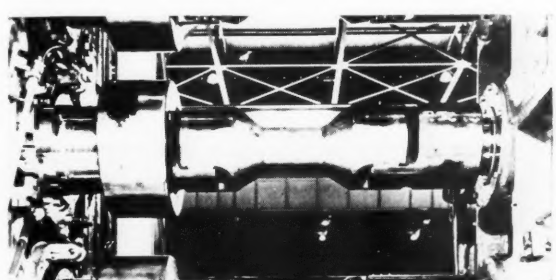


Fig. 8. Typical Universal Bearings for Driving Calender Rolls Equipped for Cross Axes Adjustment

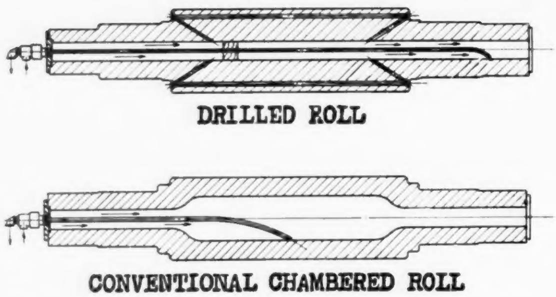


Fig. 9. Cross-Section of Drilled and Bored or Chambered Calender Rolls

promises with an average roll crown which will permit only a few of the compounds to be accurately calendered. This limitation also handicaps the compounder, since the stock must not be too tough or too hard to process at reasonable calendering temperatures.

One method of permitting such an adjustment is to provide a roll crossing arrangement in the calender. Calenders with this arrangement have been in operation in Europe for some years, but it was only two years ago that we placed the first units of this type in operation in this country.

When two rolls are crossed, the roll surfaces at the centerline of the calender retain their relative positions; whereas the roll surfaces of the ends of the rolls move apart from each other, thus producing an effective crown. This change in roll axis relation makes it difficult to use ordinary connecting gears and requires special provisions for driving the rolls. The European calenders, built by ECK of Germany, had the roll connecting gears mounted on ball joints so that the teeth on the two gears could remain in mesh even though the roll axis were crossed. In this country we have found it more practical to drive the rolls through universal couplings, similar to steel mill practice. This permits both normal roll adjustment and roll-crossing adjustment and allows the use of accurately cut gears operating on fixed centers in an enclosed gear case. Typical universal couplings are illustrated by Figure 8. The roll-crossing adjustment is normally obtained by the use of a conventional adjusting screw operating against the roll bearing box which is, in turn, held against the adjusting screw by a hydraulic ram. Provision for roll bearing box movement of approximately ¾-inch from center will normally be sufficient, since on a 28- by 70-inch calender this is equivalent to approximately 0.010-inch crown on one roll.

In all present applications the roll-crossing adjustment is used only as a trimmer; the rolls are ground with a crown equivalent to the minimum normal requirement. On calenders with even speed rolls, such as used in forming thin plastic sheeting, if the rolls are crossed much over that required for 0.001-inch, the stock bank tends to become disturbed since the roll crossing introduces a surface friction parallel to the roll axis. On a calender with odd speed rolls, such as used in forming rubber coating, this friction effect is minor, compared to the geared friction ratio, and can be neglected.

Since the product can only be as good as the rolls on which it is made, the problem of roll design, construction, and surface finish has been of major importance in recent years. Calender rolls are commonly made of chilled cast iron. They require considerable care in the foundry to insure that the rolls will be sound and of proper hardness. Hardness of calender rolls usually ranges from 68 to 72 Shore scleroscope. The surfaces, after grinding, must be free of pinholes and blemishes.

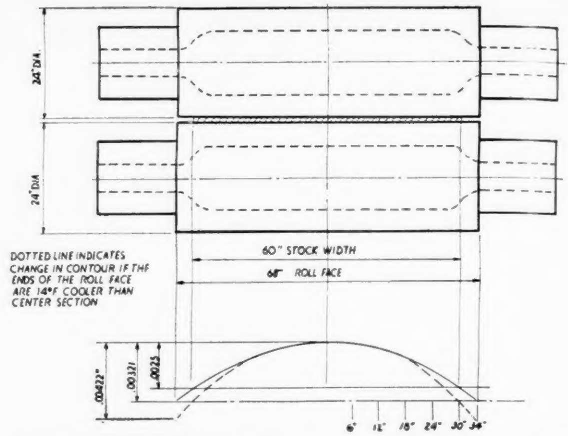


Fig. 10. Roll Load Deflection Curve for 24- by 68-Inch Calender Roll. Assumed Separating Forces Produce 0.00321-Inch Roll Deflection at Center and Result in Sheet 0.0025-Inch Thicker at That Point; with 14° F. Temperature Differential, Roll Ends Separate 0.002-Inch

The interior and the exterior of the roll must be carefully machined to insure that thermal expansion will be uniform at operating temperatures. With the increasing need of accurate temperature control the use of the "drilled"-type roll has become more common. This construction is illustrated in Figure 9, along with the conventional-type bored calender roll. It has been found that the drilled roll has a more uniform temperature across the entire face of the roll than is commonly found in the conventional bored roll. This condition is particularly true at the higher operating temperatures which are required for plastics, where it is not uncommon to operate rolls at 350° F. With the bearings at the ends of the rolls operating at temperatures usually below 200° F. it is obvious that a temperature differential is established between the roll body and roll neck. The drilled roll confines this temperature differential to the area of the roll neck; whereas in the bored roll it extends out into the roll face. The total internal surface area available for heat transfer in the drilled roll is usually more than double the area in the bored roll. The response to temperature changes in the heating medium at the roll surface is faster, owing to this greater internal area, and also to the location of the drills near the surface of the roll.

Figure 10 shows a roll load deflection curve, assuming 24 by 68-inch bored-type calender rolls, with sleeve bearings. We have assumed a 60-inch wide stock bank and a separating force sufficient to deflect the roll 0.00325-inch at the center. This would cause the sheet to be approximately 0.0025-inch thicker at the center with respect to the edge.

TABLE 1. FIGURES FOR LOAD DEFLECTION OF CALENDER ROLL AT VARIOUS DISTANCES FROM CENTER OF ROLL FACE, STANDARD CROWN REQUIRED AND CROWN OBTAINABLE BY CROSSED AXES ADJUSTMENT

Distance from Center Line Roll Face Inches	Load Deflection	Standard Crown*	Angle 0° 56′ 8″ Crossed Axis Crown*
0	0	0	0
6	0.000110	0.000100	0.000100
12	0.000432	0.000400	0.000400
18	0.000955	0.000890	0.000876
24	0.001656	0.001600	0.001600
30	0.002500	0.002500	0.002500
34	0.003208	0.00321	0.003211

*Crown dimensions are given on radius to compare with roll deflection. Normally, crown is measured on the diameter.

We have also shown a calculated normal crown curve which represents the roll contour obtained from a roll grinder set for a crown of 0.0065-inch on the diameter.

We also show, in Table 1, the crown effect obtained by roll crossing. It will be observed that the crown effect from roll crossing is very similar to that obtained by the crowning attachment on a roll grinder. It will be observed that either roll crossing or roll grinding crown compensates accurately for roll deflection.

Temperature differences along the roll face will affect the roll surface contour. If the end of the roll is 14° F. less than the middle of the roll, it will cause the end of the roll to be approximately 0.002-inch smaller in diameter. A temperature difference such as this is not uncommon with bored-type rolls operating at high temperatures, but it normally would not extend more than about 14 inches into the roll face.

Such a temperature difference would modify the roll contour as shown by the dotted line in Figure 10. The change in contour would be roughly similar to increasing the crown on the roll. Since such temperature differentials are held to a minimum in the drilled-type roll, the roll contour is not greatly affected.

In actual practice, especially for thin plastics sheeting, it is almost always necessary to hone new or freshly ground rolls in place in the calender. Trial runs are made to check the sheet gage, and then honing blocks are used to make final changes in roll contour to obtain the extreme accuracies required. This work can be minimized and in some cases eliminated by use of drilled rolls in combination with roll-crossing adjustment.

The problem of the calender roll heating and cooling medium and control of roll surface temperature is of major importance in the calendering processes, but this is a separate subject in itself and will not be discussed here.

Speed Regulation, Wind-Ups, Etc.

Since the separating force between the rolls of the calender is affected by speed, it is desirable to have roll speed control which will be stable under normal operating conditions. Many old-time calenders obtained speed control by using wound rotor induction motors with adjustable resistance in the secondary, or DC motors with resistance in the armature circuit. Either of these methods is troublesome, since the motor speed will vary in proportion to changes in load torque at the lower speeds. The modern precision calenders are commonly equipped with speed regulators which hold the calender speed at the preset level within 1% or 2% for load changes as high as 50%. While load changes of this magnitude seldom occur in operation, it illustrates one of the precautions which have been taken to eliminate one variable that might affect accurate gage.

Since calender frames and adjusting screws will expand and contract as a result of temperature changes, it has been found desirable to maintain constant temperature in the area immediately surrounding the calendering machine. This is done to minimize temperature changes in these parts, resulting from changes in the weather or drafts due to doors opening and closing, etc.

The quality of unsupported sheeting, either rubber or plastics, is also affected by the process equipment which handles the material after it leaves the calender. Control of the rate of cooling of the material to avoid the setting up of strains, and accurate stretch control of the material, are required to obtain a uniform and quality product. This point is particularly true in the plastics field where the material is shipped direct to the customer after it leaves the calender. Recording thickness gage instruments and tension control devices are utilized to improve product quality control. Further, as calender production speeds increase, the problem of the wind-up becomes more complicated. It is impractical to slow down a calender to allow the operator to change rolls at the wind-up, since speed and temperature changes will considerably affect the quality of the material. Accordingly the wind-ups must be designed to permit roll changing at operating speeds and are becoming more of a problem as the speeds are increased. Many of the recent calenders have been designed to operate at speeds up to 300 feet per minute. Some of the wind-ups being used for this speed are similar to those in use in the paper industry where it is necessary to change rolls at speeds up to 2,200 feet per minute.

Conclusions

The old calender process could almost be defined as an art; whereas the modern process, with extreme accuracy requirements, is more of a science. As further improvements are made in machines and instruments, we can expect to attain successful operation of continuous calendering processes with automatic control of temperature, product gage, speed, and material handling.

Rubber Industry Progressing in Brazil

Brazil produced 25,770 tons of rubber in 1948, contrasted with 32,931 tons in 1947. Cessation of foreign buying after August, 1947, and difficulties in financing by which producers were discouraged are said to have been the causes behind the decrease. However at the end of 1948 a law was passed permitting the expenditure of 150,000,000 cruzeiros to finance the surplus of the 1947-48 and 1948-49 rubber crops not used by domestic manufacturers, and it is expected that as a result production will be from 8% to 10% above the earlier estimate of 25,000 tons for the production of the current year.

Manufacture of rubber goods continues to develop favorably so that it may be expected that an increasing part of the rubber output will be consumed by home industries, further easing the crude rubber situation here. The output of tires especially has increased markedly in the last few years, and the demand for passenger-car tires can be covered by domestic production; but a shortage of truck and bus tires still exists. In 1940 the Brazilian rubber industry produced 236,189 tires; by 1947 the number had grown to 889,983 units; while at the same time the output of inner tubes rose from 186,576 units to 694,492 units. It is understood that production plans for 1948 envisaged a total of more than 1,000,000 tires, with consumption of 15,000 tons of rubber.

Local manufacturers are aided by the policy of restricting the importation of goods that can be produced here in adequate amount and quality. The Committee for Protection of Rubber, which controls not only production of raw rubber, but also its conversion into manufactures, pointed out that in 1947 it had by its restrictive policy saved the country almost $2,000,000 which could better be diverted to pay for more essential imports; it was added that it was expected that 1948 figures would show a saving of $8,000,000 to $10,000,000.

Meanwhile statistics indicate that at least during the first quarter of 1948 there was an increase in imports of tires to 418 tons, against 229 tons in the same period of 1947, and of tubes, to 58 tons from 25 tons in 1947. The greater part of the tires and tubes were supplied by the United States.

Consumption of natural and reclaimed rubber during the first half of 1948 is figured at about 10,000 tons. In the first six months of 1948, production included 234,915 passenger-car tires, 231,623 truck and bus tires, and 341,813 inner tubes.

A local firm experimenting with the manufacture of rayon tire cord is shortly to begin production. If the article proves satisfactory to the trade, the concern will be in a position to expand production to supply the entire local industry. At present rayon tire cord is imported exclusively from the United States.

It is learned that the Brazilian Government has authorized the establishment by the French Michelin concern of a factory at Sao Paulo for processing rubber and for producing rubber goods.

Brazil imported 5,271 metric tons of carbon black in 1947, of which the United States supplied 5,021 metric tons.

Tear Initiation and Tear Propagation[1]

J. M. Buist[2]

IN A previous paper[3] it was shown that the mechanism of tearing was not the same with all rubbers and some rubbers had a tendency to develop knotty tears. In fact, the good tear resistance of Butyl rubber at elevated temperatures could be explained on the basis of development of knotty tears. Having obtained a knotty tear with a natural rubber "gum" stock and proved that structure effects between carbon black and rubber micelles are not necessary prerequisites of knotty tears, it was probable that rubbers containing different fillers would have different mechanisms of tearing. It is well known that some fillers produce a marked grain effect, but, in addition, the present investigation has shown that certain non-black fillers have a tendency to give knotty tears.

In order to improve the accuracy of the crescent tear test a new and improved I.C.I. tear cutter has been developed,[4] and this cutter was used in the present work.

The opportunity has been taken to compare the angle tear method[5] with the more widely adopted crescent tear method.[6] The suggestion has been made[4] that the angle tear method gives a measure of tear initiation, whereas the crescent method gives a measure of tear propagation. Some authors[7] are of the opinion that tear initiation is more important than tear propagation, and they favor the angle method for this reason. Studies of tear initiation are undoubtedly important, and one day it may be possible to suggest methods of delaying and preventing tear initiation; at the present time, however, tears and cuts are initiated by many different mechanisms, e.g., ozone cracking, flexing, and penetration of sharp objects into the rubber, and the problem of tear propagation would exist even if improvements in tear initiation were made. In the present author's opinion, therefore, the relative importance of the two types of test is largely a debating point, and in practice both types are important and should be studied. The angle method can therefore never be considered as a replacement for the crescent method, and later in this paper some of the defects of the angle method are discussed. The I.G. tear test[8] using nicked Schopper rings has also been included in the present investigation in order to classify this method, which was in general use in Germany.

Classification of Tear Tests

Tear tests have been classified into the following main groups:[9] (1) direct tearing; (2) tearing perpendicular to the direction of stretching.

The first group is analogous to ply separation tests, where the width of the sample torn is unimportant, but in the second group the force required to tear the test-piece increases as the width is increased; therefore the width of the sample is an important dimension in the case of group (2) test-pieces. It was therefore suggested that the results of group (2) tests should be expressed as kgs./cm.^{2} or lb./in.^{2} in order to take the width of the sample into account. During discussion of this test for inclusion in the revised draft of B.S. 903 it was agreed that it would be better to express the result as a load corrected for a standard thickness and width. The standard thickness and width were chosen to be two millimeters and one centimeter, respectively.

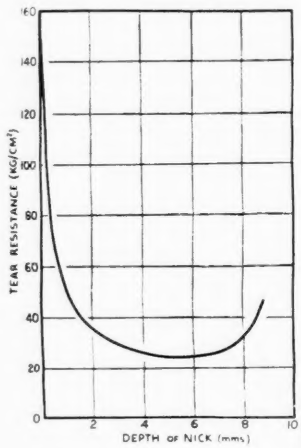


FIG. 1

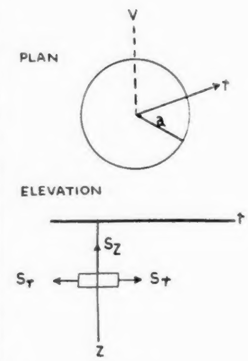


FIG. 4

FIG. 3

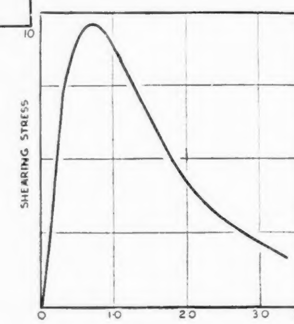


FIG. 5

Fig. 1. Depth of Nick *vs.* Tear Resistance for Crescent-Type Tear Samples. Fig. 3. Schematic Diagram of the Progress of Tear in Test Sample with Fibering Present. Fig. 4. Schematic Diagram for Mathematical Analysis of Load Distribution over Circular Area on a Plane Surface. Fig. 5. Shearing Stress against Depth z/a

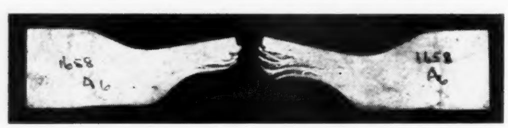


Fig. 2. Fibering in Butyl Rubber Sample Containing 80 Volumes Winnofil

The crescent, angle, and I.G. tests are all group (2) tests. My contention that the width of the test-pieces was important in the crescent sample has been doubted by R. H. Taylor,[10] who has raised the point that the data given in Figure 24[3] were obtained using straight strips. The work on the effect of depth of nick has now been repeated, using crescent test-pieces. The results are given in Figure 1 and show conclusively that the crescent test is indeed a group (2) test; therefore the width must be taken into account when expressing the results.

A point not sufficiently realized is that although a tear test may be classified as a group (1) or a group (2) test, the classification may alter during testing if knotty tears occur. When a knotty tear develops, either a direct tear

[1] Presented before the Second International Rubber Conference, London, England, June, 1948.
[2] Imperial Chemical Industries, Ltd., Manchester, England.
[3] J. M. Buist, *Trans. Inst. Rubber Ind.*, 20, 155 (1945).
[4] J. M. Buist, R. L. Kennedy, *India Rubber J.*, 110, 809 (1946).
[5] F. L. Graves, India RUBBER WORLD, 111, 305 (1944).
[6] ASTM D624-44.
[7] R. E. Morris, R. U. Bonnar, *Ind. Eng. Chem. (Anal. Ed.)*, 19, 436 (1947).
[8] C.I.O.S., XXXIII—19.
[9] Patrikeev and Melnikov, *Caoutchouc and Rubber (U.S.S.R)*, 14, 12 (1940).
[10] Private communication.

becomes a perpendicular tear or a perpendicular tear becomes a direct tear. In other words, when a knotty tear develops in a group (1) test, the test becomes a group (2) test. Similarly, a group (2) test can be converted to a group (1) test. In most cases, therefore, where straight tearing does not occur, the test is a mixture of group (1) and group (2) tests. This is one reason why the earlier suggestion[3] that the tear resistance should be expressed as—

$$T = \frac{L}{t \times D}$$

(where T = tear resistance
L = applied load
t = thickness
D = distance tear travels).

did not explain all the anomalous results obtained with knotty tears. In fact, it is now clear that this contention will only apply to cases where knotty tears occur in a group (1) test or with a straight tear in a group (2) test, and the method should not be used with knotty tears in group (2) tests. Even in a group (1) test it is only the "knotty" part of the path which should be taken into account.

Different Types of Knotty Tears

Previously,[3] the different types of knotty tear obtained with the crescent test-piece were discussed fairly fully. One further example deserves mention at this stage, and this is the case of fibering which occurred with a sample of Butyl containing 80 volumes of Winnofil (see Figure 2). It was noted previously that Butyl rubber had a marked tendency to develop short direct tears in the direction of stretching. In this series of experiments the number of direct tears increased as the volume loading of the Winnofil was increased until at high loadings the rubber "fibered" at the high elongations. It has been pointed out[11] that when Butyl is under a high strain, the material becomes anisotropic; and when a pin is inserted into the rubber, it can be moved along the fibers (i.e., in the direction of stretch) relatively easily, whereas it cannot be moved across a fiber. This condition merely shows orientation in the direction of stretching and must not be taken as an indication of crystallization since the same tendencies can be found with GR-S samples. A greater degree of orientation will increase the cohesive forces between fibers as the fibers are packed closer together. It seems probable that the cohesive forces between fibers or chains will reach a limiting value, and then the structure will be locked in such a way that any additional force will deform the structure in an analagous way to the deformation of a crystal lattice. In other words the forces applied first of all produce maximum packing; then additional force is required to rupture a chain or groups of chains. This explanation is in accord with the types of knotty tear obtained with Butyl rubber and fully explains the observed phenomena.

Considering further the development of this fibering as the tear proceeds across the test-piece, let us assume that, in Figure 3, the tear starts from the base of the cut in the region of A and continues, roughly speaking, in a straight line until point B is reached. At point B the lateral tension t_2 reaches a value where it exceeds the secondary forces holding the fibers or chains together, and a direct tear starts at B. As this tear proceeds, the tension t_2 relaxes and is dissipated until the tear at B cannot proceed further. Meanwhile, during this time the other component of the tension t_1 is increasing and produces further packing which helps to increase the resistance to the direct tear at B. When the tension t_1 reaches a value in excess of the rupture strength of individual fibers or groups of fibers, a straight tear starts at point C and proceeds to point D. At point D the tension t_2 is again sufficient to split the fibers, and another direct tear starts. This process continues until the sample is torn across the complete width. The number of direct tears and their spacing is controlled by the rate of propagation of the direct tear and the corresponding relaxation of the tension t_2, along with the rate of build up of tension t_1 in relation to the strength of individual fibers or groups of fibers.

One may ask why this phenomenon is not observed with other rubbers. The correct answer is that a few examples of natural rubber have been found to fiber, but they occur infrequently. This point would indicate that the secondary forces in the case of other rubbers are higher than those of Butyl rubber and approach more nearly the order of the rupture strengths of the actual fibers. This is confirmed by the data quoted in the following table.[12]

TABLE 1

	Covalent Bond Energy along the Chains, Cal./Mol.		Molar Cohesion per 5Å. Chain Length with Coordination Number Four, Cal./Mol.	
Natural rubber	$-C=C-$	70-120,000	$(CH_2)(CH=C.CH_3)$	1,300
Neoprene GN	$-C=C-$	70-120,000	$(CH_2)(CH=CCl)$	1,600
Butyl	$-C-C-$	70-80,000	$(CH_2)(CH_3)$	1,200

Subsurface Strain

Evidence has been put forward[3] that the degree of strain is not uniform throughout the thickness of the sample. Many new examples illustrating this phenomenon have been found in the present work. Recognizing that in the case of a load distributed over a small area of a plane surface the maximum shearing stress does not occur at the surface, but at some distance below the surface, the practical evidence can be summarized as follows. After rupture some samples show a straight line down the center of the ruptured surface; others show a definite fracture in a subsurface plane, and others, typical examples are given in Figures 9, 10, 13-17, show a tongue-shaped tear where the peaks and valleys locate the line of maximum shearing stress very exactly.

Problems similar to these have been tackled mathematically, and the following solution has been worked out for a simple case.[13]

Consider a load distributed over a circular area of radius a on a plane surface (see Figure 4).

If q is the load applied over the area the stress components are given by

$$S_z = q\left[\frac{z^3}{(a^2+z^2)^{3/2}} - 1\right]$$

$$S_r = S_t = \frac{q}{2}\left[\frac{2(1+Q)z}{(a^2+z^2)^{1/2}} - (1+2Q) - \frac{z^3}{(a^2+z^2)^{3/2}}\right]$$

where Q is Poisson's ratio.

The shearing force is given by

$$\tau = \tfrac{1}{2}(S_r - S_z) =$$

$$\frac{q}{2}\left[\frac{1-2Q}{2} + (1+Q)\frac{z}{(a^2+z^2)^{1/2}} - \frac{3}{2}\frac{z^3}{(a^2+z^2)^{3/2}}\right]$$

This becomes a maximum at $\left(\dfrac{\partial\tau}{\partial z}\right) = 0$

Therefore we have

[11] J. H. Fielding, *Ind. Eng. Chem.*, 35, 1259 (1943).
[12] R. E. Burk and O. Grummitt, "Chemistry of Large Molecules," p. 65. Interscience Publishers, Inc., New York (1943).
[13] M. G. Evans, private communication.

$$\frac{z}{(a^2+z^2)^{1/2}} = \tfrac{1}{3}\,[2(1+Q)]^{1/2} \qquad z = a\sqrt{\frac{2(1+Q)}{7-2Q}}$$

Hence τ max.

$$= \frac{q}{2}\left[\frac{1-2Q}{2} + \frac{2}{q}(1-Q)\,[2(1+Q)]^{1/2}\right]$$

Hence the actual magnitude of the shearing force is independent of the dimensions of the material and the loaded area, but is dependent only upon the load and the value of Poisson's ratio Q for the substance.

Figure 5 shows the value of τ as a function of z/a for value of $Q = 0.5$.

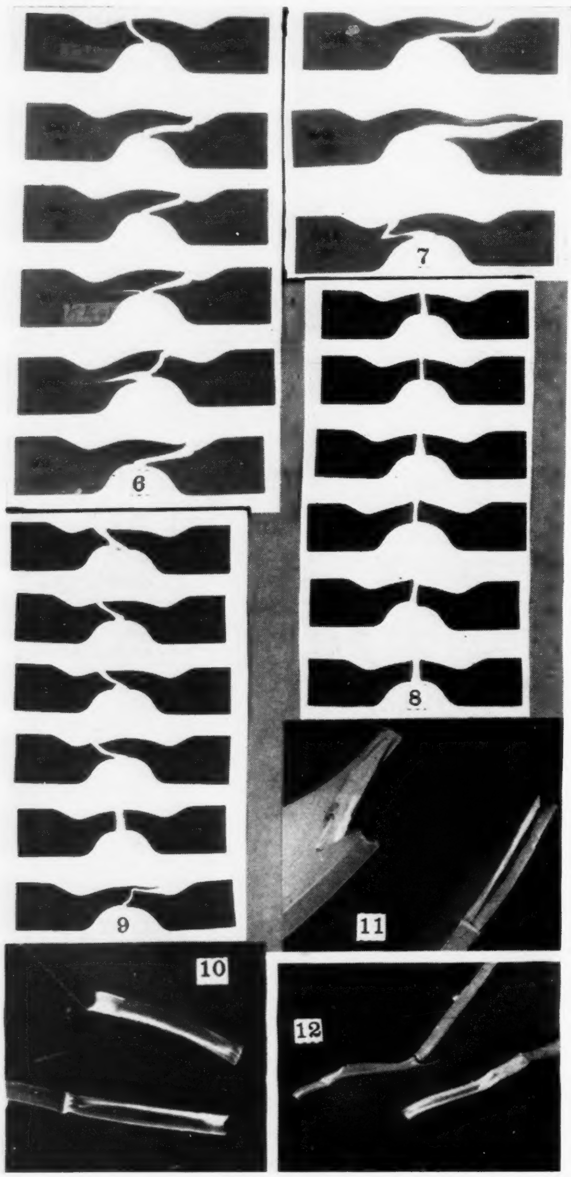


Fig. 6. Direct Tear and Knotty Tear in GR-S Containing 150 Parts Calcene. Fig. 7. Development of Direct Tear into Knotty Tear. Fig. 8. Example of Poor Tear Resistance of Butyl Rubber Containing China Clay. Fig. 9. Poor Tear Resistance of Butyl Rubber Containing 300 Parts Whiting. Figs. 10, 11. Maximum Shear Stress Development in Subsurface Plane of Natural Rubber with Winnofil. Fig. 12. Pronounced Tongue Tear in Angle Test Piece—Natural Rubber

Naturally this solution cannot be applied directly to either the crescent or angle test-pieces as the stress concentrations complicate the mathematical analysis, but it is significant that in all the practical cases examined the maximum stress occurs in the region of the center of the sample where, as in the simpler case referred to in Figure 5, the stress curve is skew, and the maximum stress occurs nearer the surface. By concentrating the stresses at the base of the crescent or angle the shear stress distribution curve is thus changed from a skew distribution to an almost Gaussian distribution.

Discussion of the Effect of Different Fillers in GR-S, Butyl, and Natural Rubber

Comprehensive tear resistance data have been obtained with a range of fillers in the above rubbers, but in the present paper the discussion is centered on points of interest rather than on detailed results.

GR-S

First of all, it is possible to dispose of any argument that direct tears are due to grain effects. It has been found that knotty tears and direct tears occur in samples cut both along and across the grain. A direct tear and a knotty tear can, in fact, occur side by side in the same sample, and this point is illustrated by the samples of GR-S containing 150 parts of Calcene by weight, shown in Figure 6. The explanation of this phenomenon is that the tear proceeds along the direct path first, and as the tear proceeds, so the stress is dissipated. The stress is still concentrated at the base of the nick, and eventually a stage is reached when this stress concentration is sufficiently high to start the knotty tear, and the direct tear stops.

The sample shown in Figure 7 demonstrates how a direct tear can develop into a knotty tear.

Butyl

The poor tear resistance of compounds containing China clay is well illustrated by the Butyl samples shown in Figure 8, where the discoloration in the region of the tear is due to the rubber being pulled away from the filler. In other words, little reinforcement is imparted by the China clay; the bonds between the filler and the rubber are very weak, and on stretching, the rubber is pulled away from the filler/rubber interface and snaps. It will be noted from close examination of the samples that the tear path is slightly curved at each end. In a previous example[3] the higher permanent set in the region of the start of the tear was taken to illustrate the fact that a higher elongation is necessary to initiate a tear than to propagate a tear. The explanation of the higher permanent set at the end of the tear is provided by Figure 1, where it is shown that in the crescent test-piece the stress passes through a minimum, and as the tear approaches completion, the stress and strain both increase and produce a higher degree of permanent set. This is a very neat, practical confirmation of previous work.[3, 14]

Compounds containing whiting also have small forces of cohesion at the rubber/filler interface, and again we find that the rubber is pulled away from the filler. Evidence of this condition is shown by the discoloration of the rubber in the region of the tear in sample 1651 B6, containing 300 parts of whiting by weight, in Figure 9.

Butyl rubber is a very convenient polymer to use in the study of the mechanism of tearing since it has a high permanent set which is sensitive enough to show up some of the stress gradients in the sample.

[14] W. F. Busse, *Ind. Eng. Chem.*, 26, 1194 (1934).

Natural Rubber

Winnofil imparts a high tear resistance to natural rubber,[15] and an examination of the samples shown in Figures 10 and 11 leads to several quite important observations. Samples M.680·7 and M.682·11 show very clearly that a maximum shear stress has been developed in a subsurface plane.

With the angle tear test-piece the higher stress concentrations produce a more marked tongue tear, and the shear stress is more concentrated than with the crescent test-pieces. An actual sample is shown in Figure 12; the shear stress distribution curve is narrower in the case of the angle test-piece, and the maximum shear stress may be greater. The stress concentrations may be too high in the case of the angle test-piece, and the samples in Figure 13 illustrate that in many cases the samples do not tear across the test-piece, but along the line of applied force.

The Calcene samples have the same type of tears as the Winnofil samples, and all the preceding discussion applies equally to Calcene compounds. Several interesting samples showing a maximum shear stress in two planes at right angles were found. With sample M.675·12 (Figure 14) the tear starts, and the line of maximum stress can be seen. After the tear has proceeded about quarter-way across, a direct tear has been initiated, and here again there is evidence of a maximum shear stress. Several samples showing this effect were found, and it may or may not be significant that the double effect was only found in samples tested at elevated temperatures.

With the angle tear specimens the only interesting point is the high preponderance of tears which occur along the line of applied force. These examples certainly show that in the angle test-piece the point of tearing is in line with the boundary line of the test-piece, but the stress gradient appears to be too high for compounds containing white fillers.

With zinc oxide samples, examination of the ruptured surfaces of both crescent and angle test-pieces revealed that, although there is evidence of a maximum shear stress being built up in the inner layers, the tongue tears are not deep. In other words, the stress gradient is not steep. Zinc oxide compounds have a higher tear resistance than those containing Winnofil and Calcene, and it is an experimental fact worth noting that as the strength of the material increases, so the frequency with which samples showing evidence of maximum shear stress in subsurface planes are found, decreases. This fact is substantiated by the results obtained with black compounds.

The different types of tear found with carbon black stocks of natural rubber were discussed in an earlier publication.[3] In the present discussion only new types are considered.

With the crescent test-piece some Kosmos-20 compounds provided several examples of the serrated-edge type of tear, and sample M.2413·2 shown in Figure 15 is typical. The angle tear specimens are interesting, and in sample M.2413·7A, in Figure 16 there are three stress planes. Along the middle plane of maximum stress there are three points where the stress is further intensified and the rubber has been plucked out in the form of solid triangles. In other examples only one triangle was plucked out.

The Magecol samples show the tongue tear typical of a maximum shear stress in the subsurface planes, and in addition samples M.2409·1A (Figure 17) and M.2409·3A (Figure 18) show a serrated edge tear.

In the case of Kosmobile HM compounds there is little new to note apart from the fact that only two cases of tongue tears were found with crescent test-pieces. Two

[15]"Winnofil. A White Reinforcing Rubber Filler." Imperial Chemical Industries, Ltd.

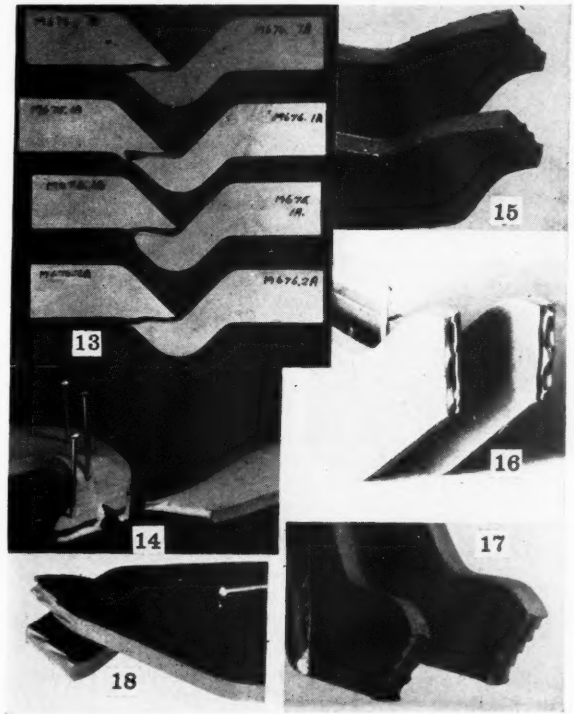


Fig. 13. Tear along Lines of Applied Force in Angle Tear Sample—Natural Rubber. Fig. 14. Evidence of Maximum Shear Stress in Two Planes at Right Angles—Natural Rubber. Fig. 15. Serrated-Edge Type of Tear—Kosmos-20 Carbon Black in Natural Rubber. Fig. 16. Angle Tear Specimen Showing Three Stress Planes—Natural Rubber. Figs. 17, 18. Serrated-Edge Tear—Natural Rubber Containing Magecol

examples were also found with the angle test-pieces, and the depth of the tongue was greater, presumably owing to the higher initial stress concentrations. Other examples show the "herringbone" effect,[3] and it should be realized that this is the same as the serrated edge tear, but in the "herringbone" samples the effect is confined to the surface of the torn edge.

Discussion of the Crescent and Angle Test Pieces

In the crescent test-piece a nick 0.02-inch in depth is introduced into the specimen, and the test is really a measure of the propagation of this initial nick. In the angle test-piece, however, the stress is concentrated at the base of the 90-degree angle, and no nick is introduced. The test is therefore a combination of tear initiation and tear propagation. The stress is built up at the base of the angle until it is sufficient to initiate a tear, and then further stresses are required to propagate this tear. Using a normal tensile dynamometer it is only possible to measure the overall force required to rupture the specimen; therefore the force cannot be analyzed into the components producing (*a*) initiation and (*b*) propagation.

Even if this separation of forces into components were possible, the interpretation of the results would be difficult for the distribution of the stresses in these test-pieces is complicated. Therefore, although the angle tear results are generally of a lower order than the crescent tear results (both expressed as kgs./cm.^{2}) this point must not be interpreted by itself to mean that the stress required to initiate a tear is less than that for propagation. As Graves[5] has shown, the stress concentrations in the angle test-piece are much higher than in the crescent test-piece, and this condition will lead to the recorded forces

being lower than those required to tear the crescent test-piece.

In the angle test-piece the point of tearing has been made to correspond with the boundary line of the test-piece instead of with the center line of pull between the boundry lines of the crescent test-piece. This condition increases the stress gradient, and, as Figure 2 of Graves paper[5] shows, there are several regions of high stress near the apex of the angle. It is sound to argue in favor of a test-piece where the stress at the point of tearing exerts the dominant influence on the tear resistance, but the claim that the angle test-piece meets this requirement cannot be substantiated. In point of fact, the angle test-piece has widely different stress gradients across the width of the test-piece; therefore from the physical point of view the angle test-piece is even more inhomogeneous than the crescent test-piece. If the minimum force required to initiate a tear could be recorded, this objection would be less important, but in the present form of test it cannot be ignored. It has been shown[3] how the different stress distributions in the crescent test-piece produce different types of tearing and lead to more variable results. A powerful objection to any method of intensifying "stress heterogeneity" in the test-piece is that the difference between straight and knotty tears is increased. This view has been confirmed by the practical results obtained with different fillers in natural rubber. With semi-reinforcing white fillers the angle test-piece tends to develop a large number of very pronounced knotty tears. In fact, with most of these samples the tear proceeds along the boundary line of the test-piece in the direction of pull. As this action occurs with samples cut along and across the grain, it means that with certain compounds the component of stress in the direction of pull is too high. It is significant that as the strength of the test-piece increases, so the frequency of tears in the direction of pull decreases.

The two test-pieces have been compared over a range of volume loadings of different fillers in natural rubber, and an analysis of the different types of tear obtained with the different fillers is given in Table 2.

Table 2. Comparison of Number of Straight and Knotty Tears

	Crescent Tear		Angle Tear	
Filler	Straight	Knotty	Straight	Knotty
Whiting	90	..	90	..
China clay	90	..	90	..
Zinc oxide	..	90	15	75
Calcene	..	90	10	80
Winnofil	..	90	..	90
Kosmos-20	76	14	75	15
Magecol	32	58	30	60
Kosmobile HM	25	65	63	27

The results fall into three groups. In the first group whiting and China clay, which have low values for tear resistance, do not show knotty tears, and no example of knotty tearing was found with either test-piece. As the resistance to tear increases, however, with the fillers in groups 2 and 3 a large number of knotty tears is found. In the carbon black group Kosmobile HM and Magecol are found to favor knotty tearing but Kosmos-20 favors straight tears.

It is interesting that the proportion of straight tears to knotty tears is generally of the same order with both types of test-piece. It should be noted, however, that the angle test-piece usually shows more pronounced knotty tearing when it occurs. There is, therefore, little advantage in either test-piece since each produces knotty tears with all the attendant difficulties of interpretation.

Carrying the above analysis a stage further, examination of the individual results and test-pieces showed that the proportion of straight and knotty tears was characteristic of the filler and was reasonably constant for all volume loadings of the filler in natural rubber. This generalization also appears to be true in the case of similar GR-S compounds, but some indications have been obtained with a series of volume loadings of Winnofil in Butyl that as the proportion of filler is increased, so the number of knotty tears increases. These observations are based on results from vulcanizates which were given a cure corresponding to the optimum as determined from tensile strength. It may be that the proportion of straight and knotty tears would be different with under and over cures.

In order to complete the comparison of the two methods it is necessary to compare the reproducibility of test results. The coefficients of variation obtained are in general agreement with those published by Morris and Bonnar.[7] The angle method has an average coefficient of variation of 5%, and the crescent method, using the I.C.I. tear cutter, an average coefficient of 6-7%. Although the fact that the angle method has a lower coefficient of variation is important, it must be remembered that the decision as to which is the more suitable test cannot be based on error considerations alone. The relation of the test to service conditions, and the discriminating power of the test are two of the other considerations which must be taken into account. As neither test can be expected to correlate with any one set, or all types, of service conditions, we need only concern ourselves with discriminating power.

Considering the need of a test to measure tear initiation, the present author stated in 1945 that it was difficult to see how existing methods for measuring tensile strength could be modified suitably so that the stress to start a tear could be measured. In point of fact, the angle test is only a severe tensile test, and the danger is that it may be too severe. In the earlier investigation[3] results were obtained using the unnicked crescent sample. This test is not so severe as the angle test; yet it gives a measure of tear initiation. If the unnicked crescent were suitable, it would have the added advantage that both initiation and propagation experiments could be carried out on the same test-piece.

In order to illustrate that the angle test is too severe the results given in Table 3 have been compiled, and tensile strength, unnicked crescent, crescent tear, and angle tear measurements are compared.

From the table below it is seen that the unnicked crescent results are always intermediate between the normal tensile strength determinations and the standard crescent tear results. This condition is to be expected as the stresses are concentrated in the crescent sample; therefore

Table 3

Compound	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Tensile strength, kgs./cm.^{2}	253	244	184	157	191	255	264	239	169	171	150	135	118	84	79
Unnicked crescent tear, kgs./cm.^{2}	218	220	180	149	136	223	219	214	127	132	117	109	94	76	68
Crescent tear, 0.02-in. nick, kgs./cm.^{2}	160	111	72	100	50	172	153	162	74	77	72	70	63	54	44
Angle tear, kgs./cm.^{2}	110	62	35	65	30	107	100	101	37	39	39	41	36	36	37

Compound 1 = natural rubber tread.
2 = Neoprene GN tread.
3 = GR-S tread.
4 = Butyl tread.
5, 6, 7, 8 = increasing loadings of Kosmobile HM in natural rubber.
9, 10, 11, 12, 13, 14, 15 = increasing loadings of Winnofil in natural rubber.

the unnicked crescent will give lower results than the tensile strength on either rings or dumbbells.

The angle tear results are always lower than the crescent tear results and are considerably lower than the unnicked crescent. In fact, the results in Table 3 show that the stress concentrations in the angle test-piece are too high and the discriminating power of the test has been reduced too far. There is a wide difference in tensile strength, unnicked crescent tear, and crescent tear of the Winnofil compounds; yet the angle tests give a more or less constant value. For these compounds, therefore, the angle test shows no discriminating power at all.

If it is felt that such a test for tear initiation should be instituted, my opinion is that the angle test in its present form is too severe. A more hopeful temporary expedient would be to use the unnicked crescent for tear initiation and the nicked crescent for tear propagation. This practice has the great advantage that both tests would be carried out on the same sample. Naturally, it is realized only too well that neither test is wholly satisfactory, but, in the meantime, until further fundamental work on tear tests is done, this approach seems the best to these difficult problems.

I.G. Tear Cutter

This method of preparing ring test-pieces[5] has been described in C.I.O.S., XXXIII-19 and BIOS 1779, and consists of inserting five slits into the inner circumference of a ring at opposite ends of a diameter. In one of the early I.G. models the razor blades were held at the appropriate angle so that all five slits were one millimeter deep and two millimeters apart and were thus arranged radially. In the latest model the razor blades are held vertically and are mounted on a curved holder which has the same curvature as the ring. By going from a radial arrangement of the slits to a vertical one, the I.G. came to the conclusion that the depth of nick is of more importance than the angle at which the nick is introduced. This confirms other work on tear resistance using crescent samples.

The results obtained in a preliminary examination of the I.G. tear cutter over a range of natural and synthetic rubbers are compared with crescent and angle tear values in Table 4.

TABLE 4

Compound	Crescent Tear, Kgs./Cm.²	I. G. Tear, Kgs.	Angle Tear, Kgs./Cm.²
1	178	40	110
2	176	51	85
3	165	45	67
4	156	40	83
5	107	33	62
6	107	14	42
7	93	27	65
8	87	23	34
9	83	26	33
10	74	19	35
11	68	21	34
12	63	23	34
13	62	20	38
14	57	13	35
15	48	13	34

Compound 1 = natural rubber tread.
5 = Neoprene tread.
10 = GR-S tread.
7 = Butyl tread.
8, 9, 11, 12, 13, 14, 15 = increasing loadings of Winnofil.
6, 3, 2, 4 = increasing loadings of Kosmobile HM.

Apart from compounds 1 and 6 the I.G. tear results fall into the same order as the crescent tear results and, in addition, when it is remembered that the I.G. results are expressed as kgs., they show more discrimination than the angle tear results. The results obtained so far have not been so reproducible as crescent tear results with the same mixes using the I.C.I. tear cutter. Both methods give a measure of tear propagation. In the same way as Poules[16] found that more reproducible results were obtained with the crescent sample, when the number of slits was reduced from five to one, it is expected that a corresponding improvement in accuracy could be achieved by inserting only one slit with the I.G. tear cutter. The I.G. used multiple slits in an attempt to find any weakness in the material. This method is a novel and interesting one of considering tear tests, but a choice of five or ten slits seems totally inadequate; and if the search for "weaknesses" is to be followed logically, then slits should be spaced equally round the whole circumference of the ring. At Ludwigshafen the I.G. modified the cutter so that two single slits were placed in the outside circumference of the ring. We prefer to use a single slit in the outside circumference of the ring and are in the process of modifying the cutter accordingly. When this work is done, it will be possible to compare the I.G. and crescent methods on a much fairer basis.

[16] I. C. Poules, India Rubber World, 103, 41 (1941).

Conclusions

(1) Both the crescent and angle tests are group (2) tests; therefore the width of the sample must be taken into account when the tear resistance is being calculated.

(2) There is one exception to the above, and that is the case of knotty tears in group (2) tests. When knotty tears occur, the test becomes a direct tear test [group (1)], and the width is no longer important.

(3) When knotty tears occur with group (1) tests, the width must be considered for, in reality, the test has become a group (2) test.

(4) Some rubbers exhibit fibering during tearing, and this is explained by the cohesive forces between fibers reaching a limiting value before the limiting value of the breaking strength of a fiber is reached.

(5) Differences in the mechanism of tearing with different fillers have been noted.

(6) Practical evidence of the existence of maximum shear stress in subsurface planes of the material has been obtained, and a mathematical solution for a simple case has been given.

(7) The angle tear method is a combination of tear initiation and tear propagation and can be regarded as complementary to the crescent test. It cannot be regarded as a replacement for the crescent test.

(8) With certain rubber compounds the component of stress in the direction of pull is too high in the case of the angle test-piece.

(9) It is suggested that the unnicked crescent be used in preference to the angle test-piece for tear initiation measurements as the unnicked crescent test-piece has more discriminating power.

(10) The same proportion of straight and knotty tears occurs with both the crescent and angle methods.

(11) A preliminary evaluation of the I.G. tear cutter indicates that the fairest comparison with other methods requires a single slit to be inserted in the outside circumference of the ring.

DURING THE FIRST HALF OF 1948, AUSTRIA IMPORTED RUBBER valued at 8,800,000 schillings (10 schillings equal $1.00 U.S.). Imports of rubber manufactures included goods to a value of 3,200,000 schillings from the United States, 4,100,000 schillings from United Kingdom, and 1,600,000 schillings from the Netherlands. In the same period of 1948, Austria exported rubber goods representing a total value of 6,400,000 schillings.

The Oesterreichische Kunststoff-Presswerke, Wels, has begun manufacturing polyvinylchloride. The company already has a productive capacity of 80 to 100 tons monthly, but at first only 10 to 15 tons a month is to be produced.

Some of the Chemical and Physical Properties of "Thiokol" PR-1 [1]

W. E. Boswell[2] and J. S. Jorczak[2]

IT IS the desired purpose of the authors to bring to you in a semi-technical manner some of the properties of the latest synthetic crude rubber-like material to be offered by the Thiokol Corp.

This is an era of accelerated chemical research. In a large way the second World War is responsible for this speed-up, and it is due to this fact that constant improvements in raw materials, finished goods, processing, and equipment have followed in the same rapid succession. As an example, the petroleum industry has had to produce better gasolines to power the improved engines for the faster and larger planes. This point sounds very simple and logical when boiled down to a single sentence, but it certainly does not give any hint of the thousands and thousands of hours of research and development that have gone into the accomplishment of this change. As other examples, ink companies are now manufacturing faster drying inks to enable faster printing, and paint manufacturers are producing new lines of paints and lacquers built around solvents that were not readily available before the late war.

In practically every change has come the need of improved rubber materials to withstand these changes in gasolines and solvents. Natural rubber, even though readily available now, does not have all the characteristics which are required to meet every need, and it has been the aim of the manufacturers of the synthetic rubbers to produce basic materials that will meet some of these requirements.

General Properties of PR-1

"Thiokol" PR-1 was developed to fill the need of a good solvent-resistant rubber and to enable the engineers and industry in general to take full advantage of the many improvements in the chemical field.

PR-1 is basically a typical polysulfide reaction product and is similar to all the preceding "Thiokols" in many respects, but differs in some others. It is a high molecular weight, long-chain polymer with mercaptan terminals available for cross-linkage and can be vulcanized into a thermoset rubber possessing good resistance to compression set over a fairly broad range of temperature. This feature will be discussed more fully later on in this paper.

"Thiokol" PR-1, as supplied to the rubber companies, is a raw material that must be compounded and vulcanized to make up the finished articles. In this respect it is comparable to crude rubber. PR-1 also requires many of the same compounding ingredients, is processed on regular rubber equipment, and is vulcanized in the same way as natural rubber. Unlike natural rubber, the so-called pure gum stocks do not possess very good physicals. It is necessary to incorporate reinforcing pigments and fillers into the stock in order to achieve the maximum physical properties of the material. So far we have found the carbon black type of reinforcement to be the best for this purpose. By varying the amount and the type of carbon black used as a reinforcing material, a rather wide range of physical properties can be achieved which enables the compounder to adjust the finished product to meet various specifications and conditions.

The method of vulcanization of "Thiokol" PR-1 differs somewhat from that of natural rubber. It is achieved by using some kind of oxidizing material such as GMF (p-quinone dioxime manufactured by the Naugatuck Chemical Division), zinc peroxide, zinc chromate, and others. To date the most satisfactory cure is obtained by using 1.5 parts of GMF and 0.5-part of zinc oxide to 100 parts of PR-1. Several other oxidizing materials are being studied that show excellent promise, but more background of experience is necessary before recommending them for public use.

All of the "Thiokol" crudes have had excellent aging characteristics, and PR-1 is no exception to this fact. It is particularly inert to sunlight, air, oxygen and ozone, and ultra-violet rays, all of which cause rapid deterioration in natural and most of the other synthetic rubbers. Normally, synthetic rubbers are not too rapidly affected by ozone at sea level because the concentration in the atmosphere is low. As the altitude is increased, so is the ozone concentration, and at altitudes which may approach 30,000 to 40,000 feet the usefulness of most synthetic rubbers diminishes rapidly. Long exposures to ozone concentrations of this high degree seem to have no effect on PR-1.

Another of the good physical properties of this material is its flexibility at low temperature without the use of a plasticizer. Typical compounds of "Thiokol" PR-1 will remain flexible to as low as —45° F., and by the addition of a small amount of a low temperature plasticizer this minus figure, it has been found, can easily be lowered to at least —60° F.

On the higher side of the temperature range, vulcanizates of PR-1 are perfectly serviceable for continuous operation up to 212° F. and even as high as 300° F. for intermittent cycles. The cured polymer does not melt or soften at elevated temperatures.

Compression Set Characteristics

Since resistance to compression-set is a very important function of vulcanizates in many applications, this characteristic in "Thiokol" PR-1 is one feature which definitely broadens the range of the usefulness of the polymer.

Ordinarily compression-set tests are run according to ASTM D395, method B, which calls for a constant deflection over a definite number of hours at a specific temperature. However it has been the thought of many rubber technologists for quite some time that a compression-set figure at only one temperature does not present a true picture of the material being tested. An excellent paper on this subject by Ross E. Morris, Joseph W. Hollister, and Paul A. Mallard of the Rubber Laboratory at the U. S. Naval Shipyard, Mare Island,[3] has been published. Some data from this report will be shown along with similar data on PR-1.

An interesting feature of the vulcanization of PR-1 is the relation between length and temperature of cure and

[1] Presented before the Division of Rubber Chemistry, A. C. S., Los Angeles, Calif., July 23, 1948.
[2] Thiokol Corp., Trenton, N. J.

the percentage of compression-set. The physical properties such as tensile, elongation, and hardness remain almost the same at cures ranging from five minutes to 30 minutes at 287° F. and from five minutes to 30 minutes at 318° F. The percentage of compression-set, however, varies greatly with the length of cure. Table 1 has been prepared to illustrate this point, and it will be seen that a cure of 20 minutes at 287° F. or 15 minutes at 318° F. will produce the best recovery figures. Compression-set of PR-1 can be reduced at least 35% by tempering the vulcanizate in a hot air oven for 24 hours at 212° F. It will be noted in Table 1 that the compression-set of the tempered articles is almost constant regardless of the cure. These compression-set tests were all run according to ASTM D395, method B, 22 hours at a temperature of 158° F.

TABLE 1. ORIGINAL AND TEMPERED COMPRESSION SET OF "THIOKOL" PR-1 OVER A RANGE OF CURES

Cure		Physical			Compression Set %*	
Time Min.	Temp. °F.	Tensile	Elong.	Shore Hardness	Original	Tempered
5	287	1400	330	71	94	24
10	287	1425	350	72	64	26
15	287	1425	340	72	42	23
20	287	1375	350	72	36	24
30	287	1375	310	72	37	23
5	318	1350	350	72	89	22
10	318	1300	360	72	43	24
15	318	1300	350	71	35	24
20	318	1325	370	71	39	25
30	318	1250	320	71	41	26

*Method B—25% compression—22 hours at 158° F. Tempering cycle was 24 hours at 212° F.

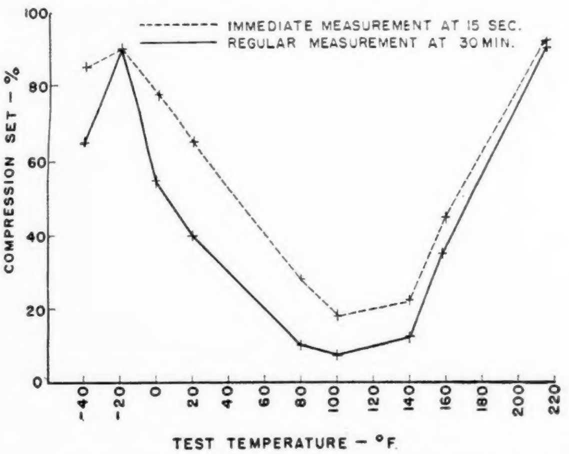


Fig. 1. Effect of Temperature on Compression Set Resistance of "Thiokol" PR-1 Tested 22 Hours at 25% Compression

In an effort to see if PR-1 followed the set characteristics of other rubbers over a wide range of temperatures, tests were made at 212, 158, 140, 100, 80, +20, —20, and —40° F., and the results are plotted in Figure 1. This curve will be seen to follow the curves of the other rubbers as shown in the Mare Island report.[3] (See Figure 2.) There is one point that should be mentioned. The specimens in the Mare Island report were all allowed the usual 30-minute conditioning period before measurement; whereas the figures on the PR-1 samples are for measurements immediately after release as well as at the end of 30 minutes' conditioning. The "immediate" measurement was taken within 15 seconds from the time the sample was released from the jig. This was accomplished by mounting a vise in the cold box or oven and placing the jig in the vise before removing the specimen. In this manner the nuts on the test jig could be removed without releasing the compression on the specimen; then by opening the vise rapidly, the measurement of the specimen could be taken in a very few seconds. The set figures are generally lower when a 30-minute conditioning period is used.

To cite a few examples—the test at 158° F. on PR-1 (Figure 1) showing 45% immediate set recovered to 35% set in 30 minutes and the one at 80° F. showing 28% immediate set came back to only 10% set after 30 minutes. The purpose of our tests was, however, to determine immediate set since this can be vitally important at times in actual uses.

Swelling Data

Vulcanizates of "Thiokol" PR-1 show good dimensional stability in both aromatic and non-aromatic fuels. Their resistance to solvent swell, however, is not confined to this group only. PR-1 shows exceptionally low volumetric swell in most of the commonly used solvents, such as the ketones, esters, aromatics, alcohols, terpenes, and others.

A few of the more commonly used solvents have been chosen as illustrations of the comparative swelling characteristics between PR-1 and other vulcanizates. Part of the data was obtained from the Thiokol laboratory, and some of the figures are from a report[5] by Fritz Rostler and Richard White. Figures 3, 4, and 5[6] have been prepared in bar graph form in order to show these differences.

The generally excellent dimensional stability of PR-1, when in contact with or immersed into the majority of solvents, makes it very interesting to the engineer or compounder who is faced with difficult application problems involving contact with such solvents.

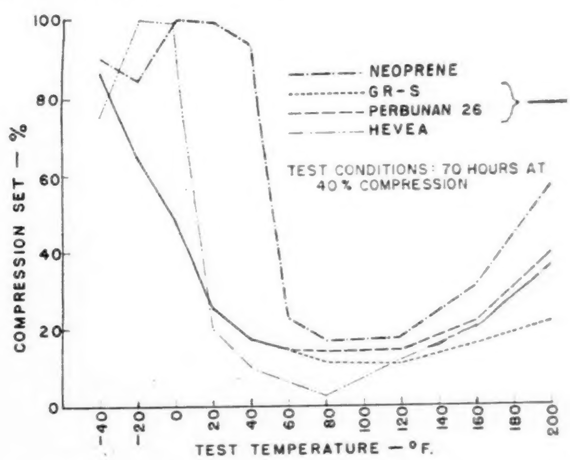


Fig. 2: Effect of Temperature on Compression Set Resistance of Various Rubbers[4]

Summary and Conclusions

In conclusion, the outstanding features of "Thiokol" PR-1 are: excellent aging characteristics; good low-temperature flexibility without plasticizer; good compression-set qualities over a wide range of temperatures; and excellent dimensional stability in many solvents. The compounder should not, however, consider it as a general-purpose rubber for use in such things as tires, rubber bands, garden hose, or girdles, but should use it in applications where its outstanding qualities will best solve his problems.

[3] INDIA RUBBER WORLD, 112, 4, 455 (1945).
[4] Fig. 11, *Ibid.*, p. 457.
[5] *Rubber Age* (N. Y.), 61, 3, 313 (1947).
[6] See next page for Figures 3-5.

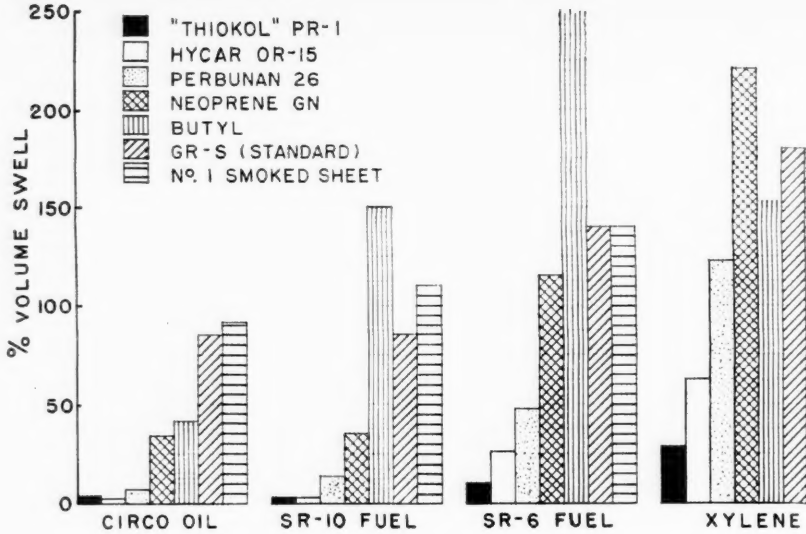


Fig. 3. Volume Swell on Immersion (30 Days at Room Temperature) of Various Rubbers in Circo Oil, SR-10 and SR-6 Fuel and Xylene

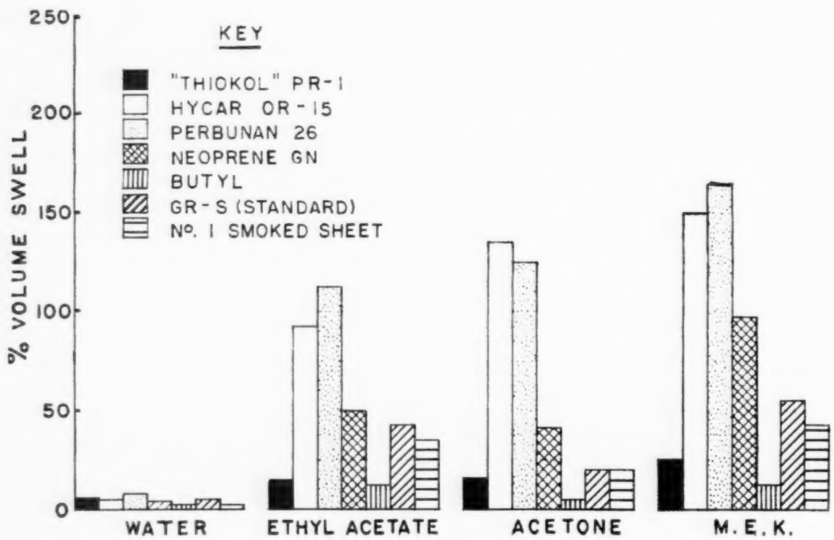


Fig. 4. Volume Swell on Immersion (30 Days at Room Temperature) of Various Rubbers in Water, Ethyl Acetate, Acetone, and Methyl Ethyl Ketone

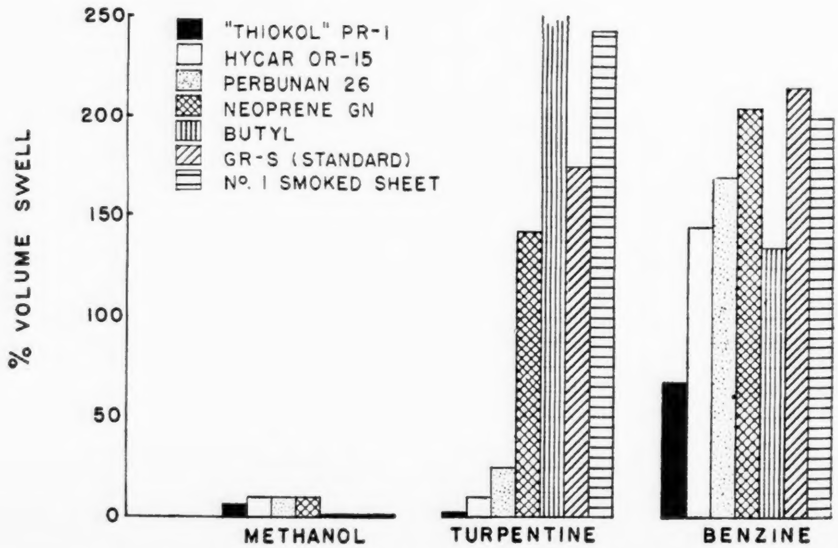


Fig. 5. Volume Swell on Immersion (14 Days at 25° C.) of Various Rubbers in Methanol, Turpentine, and Benzine[7]

[7]Data taken from Rostler and White.[5]

EDITORIALS

Something Definite Should Be Done About an American Rubber Research Institute

"RESEARCH is the price of progress."

With these words Harry L. Fisher, director of organic research for U. S. Industrial Chemicals, Inc., and before that a research chemist for The B. F. Goodrich Co. and the United States Rubber Co., for a total of 17 years, concluded his acceptance address upon being awarded the Charles Goodyear Medal of the Division of Rubber Chemistry, A. C. S., in Boston, Mass., on May 24. The title of Dr. Fisher's address was "Rubber Research and the Need for a Rubber Research Institute in the United States."

The Medalist was adding his voice to support those other leading research chemists who for the past 28 years have urged the creation of a rubber research institute in this country for the purpose of centralizing research on the fundamental properties of rubber and organizing a program that would have those very essential factors of continuity and freedom from the pressure of industry competition between companies for practical rather than fundamental research results.

As Dr. Fisher pointed out: "Industry needs the services of good research men and gains much from them. Industry, however, by its very nature finds it difficult to give a research man full rein, and the research man does not always find the industrial environment conducive to his best efforts, even though he has the full consent of the management for his method of attacking the problem, chiefly because he is part of an organization that must produce practical results.

"Industry is built on ideas, and it needs the results of fundamental research—they are its life blood. The time has gone by when a chemist can put his hand in the magic investigational hat and quickly bring out a new discovery or invention. We need more information, definite scientific information, in order to produce industrial miracles."

In this connection Dr. Fisher emphasized that there is an increasing need of capital to be put back into the bank of knowledge from which every technologist is drawing in his daily work.

"An American Rubber Research Institute would help much to put back capital into that bank of knowledge," he added. "As a matter of fact, a special type of rubber research institute is already doing this, namely, the cooperative research and development program of the Office of Rubber Reserve. However, its program is somewhat restricted, covering research and development only on synthetic rubber. What is really needed is an institute that will carry out fundamental research on all rubbers, both natural and synthetic."

In the opinion of India RUBBER WORLD, Dr. Fisher struck the right note when he said:

"An institute of this type could probably best be sponsored and controlled by American manufacturers. Since the entire public would benefit from the results, the government should contribute towards its support just as it does in accordance with the present trend in other similar instances. . . . The administration and responsibility for all fundamental research on rubbers would then be in the hands of private industry with the government in the supporting rather than an initiating role."

The cooperative research and development program of the Office of Rubber Reserve, which started during the war years and which is still being continued, has amply demonstrated the accelerated rate of progress that can be achieved under such circumstances. Although the amount of time and money spent on research of a fundamental nature was a minor part of the total, outstanding contributions have been made to the "bank of knowledge." These contributions will be made at a much reduced rate as industry participation is removed during the next year or two. Meanwhile withdrawals will be made with increasing frequency, and the present status of the "cold rubber" program indicates the need of new deposits in order that further developments in this promising field may be possible.

The above-mentioned program is concerned exclusively with synthetic rubber. The improved synthetic "cold rubber" has been shown to owe its better physical properties to the fact that the molecular structure of this synthetic rubber more nearly approaches that of natural rubber than does that of any other synthetic rubber made heretofore. Fundamental research on the mechanism of the formation and of the basic structure of natural rubber should be of great value in further improving the properties of synthetic as well as natural rubbers.

One of the most surprising facts about the rubber industry is that the technical process of vulcanization, discovered by Charles Goodyear in 1839 and without which the rubber industry in this country or the world would never have grown to its present stature, is still an unsolved problem as far as its demonstrated theoretical basis is concerned. It goes without saying that our present processes for the manufacture of rubber goods might be speeded up tremendously and their service life extended considerably if all the basic facts concerning vulcanization were known.

India RUBBER WORLD has been convinced for some time that the need of an American Rubber Research Institute is an urgent one. In order that something definite might be done about the project this time, we would like to offer the use of the editorial pages of India RUBBER WORLD for the publication of opinions both *pro* and *con* on this subject so that it may be examined as exhaustively as possible. Please address your comments to the editor at 386 Fourth Ave., New York 16, N. Y.

R. P. Dinsmore in his Colwyn lecture in England last year stated that companies, like individuals, have some obligations to advance fundamentals of their field, and the creation of an American Rubber Research Institute is the means by which these obligations may be fulfilled.

DEPARTMENT OF PLASTICS TECHNOLOGY

SatUSply—A New Plastic Decorative Surfacing Material[1]

Robert M. Paulsen[2]

SATUSPLY is the name of the United States Rubber Co.'s polyester resin decorative laminate. It is a specific material, differing in type and construction from others in an entire class of polyester laminates which we manufacture. Our laminates made of Fiberglas and other strong fabrics for specialized military uses are still in current production. These, like the others, are made in a continuous laminating process dating back to 1942 and developed and patented by my company. Because of the war continuous laminating of decorative papers, now called SatUSply, was naturally a sideline until commercial production began in 1946.

In addition to continuous laminating we also carry on molding and casting operations with the same class of resins. These operations provide the opportunity to gain the experience needed to improve and maintain the quality of SatUSply. For this project a sizable staff and a fully equipped laboratory are maintained representing a continuity of seven years' research and development activities in this promising field.

Manufacture

Before the name SatUSply was adopted, the continuous sheet made up of paper and resin was simply called a reinforced plastic, low pressure laminate, or contact pressure laminate. These names were derived from the nature of the product and the method of manufacture. The method of manufacture is contingent upon the nature of the liquid resin which hardens completely without loss of solvent or other components when properly heated.

In 1942 we began production laminating of fabrics with a true polyester, allyl diglycol carbonate, which prior to that time had been used commercially only in casting transparent sheets and other formed parts for aircraft windows. In less than five months our production requirements for this resin exceeded the supply, owing to a shortage of allyl alcohol. Because of this shortage we changed to a polyester modification, the general characteristics of which we are still using in SatUSply today, although many detailed improvements have been made since that time.

The present polyester is a combination with a vinyl component forming the molecular cross-linkage suggested to us when we took up the possibilities of substitution with every major supplier of resin. Because of a high priority on their end-use at that time, supplies of these raw materials were allocated, thus placing in production a resin which previously had rested

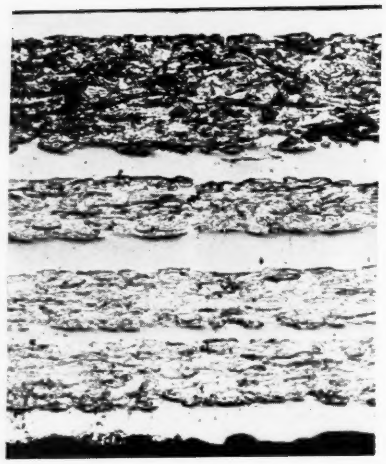


Fig. 1. Microscopic Cross-Section of SatUSply Showing Interfaces between Fiber and Resin Circumference

for some time on laboratory shelves, without any known commercial use. This substitute material turned out to be superior in processing characteristics to the allyl type for continuous laminating, although at a slightly higher cost. In fact, this change in type of polyester made continuous laminating possible, an industry which we started at the end of 1942.

Thus was initiated a field of plastics processing differing from previously known processes such as the platen-press lamination of thermosetting phenolic, ureas, and melamines, and the calendering and spreading of thermoplastics and elastomers such as vinyls, nylon, synthetic rubbers, and natural rubbers.

In the manufacture of SatUSply, paper in continuous lengths is thoroughly impregnated with the liquid resin. Heat is then applied to the assembly while it is being carried between layers of dry paper. These cover papers are subsequently stripped from the solidified paper and resin laminate. Only moderate heat and pressure are applied; the maximum temperature is about 250° F. As a result, the processing is not hard on colors, leaving them more brilliant than otherwise; strength is maintained since the fibers are not broken or distorted; and warpage is minimized since the resin is not internally strained. It is therefore possible to produce a flat and level product.

In the reinforcement of polyester resin with paper we strive to obtain the maximum bond around each paper fiber, leaving no voids unfilled with resin. The resin, being hydrophobic, does not combine with the cellulose in so close a relation as exists between water-soluble resins and cellulose. Figure 1 shows a microscopic cross-section of SatUSply in which the interface of resin and fiber circumference is clearly visible. With this relation between raw materials the product has the durability of the resin, the mechanical support of the non-embrittled cellulose fibers, and the pliability of the combination. Combinations of fibers and resins which are more intimately bound together are inclined to be as brittle or cheesy as the resin itself; the toughness of the fibers is impaired by their confinement.

The chemical resistance and durability of resins, such as used in making SatUSply, vary somewhat in their detailed modifications, but as a class they are recognized as being superior for certain purposes to practically all other plastics. They contain no plasticizers which may bleed out upon aging. We have samples in the laboratory made seven years ago which look the same now as the day they were made. No solvent is known with which these resins can be reworked, and further heat only hardens them until the ignition temperature is reached. Some fire resistant modified resins, which may later be adapted for use with certain types of SatUSply, burn only when the source of heat is held continually against the resin.

We had early evidence of the durability of the resin when the first carload, worth $35,000, polymerized en route because it was not properly refrigerated. A long period of searching for some means of salvaging the material was unsuccessful, and it was necessary to scrap the entire carload.

The action of hot concentrated caustic has about the most adverse effect on polyester resins of any chemical reagent, but this corrosive substance is rarely found in places where decorative surfaces are used. As an example of the resistance of SatUSply to deterioration by mild alkali, we use it to make the molds for one of our production operations in which the polyester laminate contains a hot aqueous solution having an alkaline pH. SatUSply has also been used to surface a counter in use for developing X-ray film and as a surfacing for chemical laboratory benches.

Physical Properties

As plastic surfacing materials become more and more inert chemically, the physical weaknesses of the products become more and more the measuring sticks used to distinguish the products. SatUSply has been put through most of these physical test ordeals and has failed in only a few: i.e., it will burn when lit with a blow torch; it will dent when struck with a sledge hammer; and it will scratch when stabbed with a bowie knife.

Of course, wood will also fail these tests although a great deal of it has been used in the past and is expected to be used in the future. Some two billion

[1] Presented before annual technical conference, Society of Plastics Engineers, Inc., Philadelphia, Pa., Jan. 19, 1949.

[2] Manager of resinous products development, United States Rubber Co., Mishawaka, Ind.

square feet of softwood plywood were sold in 1948, and because purchasing agents can dent it with their teeth should plywood salesmen therefore be thrown out? The obvious key to this paradox is the use of proper methods and tools for handling wood and applying it in the proper places. The same is true of SatUSply and any other material of construction. Every interested party has the desire to make each new material so perfect that it will apply itself and be absolutely foolproof. SatUSply has not yet filled this desire, but we are still trying.

We do have to answer the question, "Will it last?" As engineers, we often turn to our physical property measurements and in trying to provide the answers sometimes give these measurements undue weight, especially with new materials which are not fully evolved and on which the tried and usual testing methods for established products may not give the complete answers. In addition, some tried and true tests may not be pertinent to the material when considering the use to which it is put is being considered.

Such things as abrasion, shear, impact, and flexural resistances are laboriously measured by standard means. Aging at higher temperatures has not been correlated with aging at lower temperatures. The commonly held theory of double reactivity with each 10- or 20-degree temperature rise has not been proved. The existence of a threshold temperature, over which results of tests on plastics are of little value, is suspected. I review this line of thought because one or another proponent of some established type of decorative surfacing, taking the negative attitude toward a fledgling, will say that such and such a property of SatUSply is lacking, and, therefore, it will never amount to anything and should be dropped from consideration. It seems to be human nature thus to emphasize a newly discovered deficiency, often very minor in importance.

Engineers whose job it is to plan, guide, and construct sometimes take the lead in such thinking and often take too positive a position too early. We can fall in love with our testing equipment and compiled data to the extent that we retard promising developments in their early stages. The fear of fostering a "flop" is too prevalent. Pride in always being right, predicting correctly, and being extremely conservative may be an asset to a safety engineer, but should be subordinated in a development. Through it all we must realize that most new materials eventually find their rightful places if they have merit, despite the pessimists.

In the standard Tabor abrasion test SatUSply will withstand 5,000 or more rubs without defacement of pattern. The average is more nearly 10,000 rubs, and we have had one repeatedly duplicated test of more than 60,000 rubs. How many rubs indicate satisfactory service in average use of the material is not yet known, but we have had no alarming complaints of wear in service. Because of necessary acceleration, the Tabor test involves some generation of heat in the dissipation of which a thicker, denser material would have an advantage. Recognizing the limited reproducibility of this test, the latest proposed standards specify other tests, and SatUSply will be rated with them when enough significant data are accumulated.

At that, abrasion resistance, as measured by the Tabor method, can be increased in SatUSply for specific applications at the sacrifice of some dimensional stability and low moisture pickup. Highest dimensional stability and lowest moisture pickup values have been accompanied in polyester laminates by lower Tabor abrasion values, decreased flexibility, reduced flatness (giving an orange peel effect), and poorer aging. In SatUSply we attempt to keep the best balance of properties according to field test results.

Moisture pickup of the laminate ties in roughly with dimensional stability when resins of one base type are used. How much dimensional stability is needed for each application depends largely upon the base material to which SatUSply is applied. Naturally it is desirable to match the expansions due to moisture and heat of the SatUSply and the base material used. Because of the great variation in base materials encountered in the field, it would be impractical at this time to attempt to produce a grade of SatUSply equivalent in expansion to each base, and we therefore also strike a balance in dimensional stability. The overall moisture expansion of SatUSply averages 0.3%, and its thermal expansion is 1.5×10^{-5} per °F.

When we made our first field application back in 1946, material picking up as high as 12% moisture in 24 hours' immersion was successfully applied and is still in use. During the past year the average 24-hour moisture pickup on SatUSply shipped was about 6%, and in the immediate future we believe that a value of under 5% will be maintained since we are constantly decreasing this moisture absorption factor. These figures do not represent the amount of moisture absorbed by SatUSply in use since the laboratory values are obtained on small, unmounted samples having high edge-to-surface ratios and totally submerged in a tank of water. This test is exaggerated and by no means comparable to what is encountered in the field.

SatUSply has always been made and delivered to the trade in rolls of continuous length. It is now made in both cigarette resistant and non-cigarette resistant grades. By cigarette resistant we mean that a lighted cigarette resting on the laminate will not leave a non-removable blemish. It is in this grade that ply bond strength brings up a point for discussion, since the inclusion of a layer of aluminum foil in the laminate presents an opportunity for those examining unmounted samples to see if they can separate it from the paper. Of course we aim to obtain the strongest possible bond without sacrificing other properties. This bond strength has been constantly improved and will continue to be improved. Since SatUSply is always mounted to a base material with edge protection, the act of delaminating hand samples is totally irrelevant when related to conditions of use.

SatUSply can be made flexible and soft or rigid and hard; the most popular grade is, again, a compromise of these two extremes and shows a Rockwell "R" hardness value of 105 as an average. The hardest materials are more resistant to scratching, but poorest in impact resistance and surface wear. A surface with some give to it is sometimes good for wear as, for example, the rubber tire. On the other hand soft surfaces in polyester laminates are not so stain resistant as harder grades, possess a slight odor, have less desirable "feel," and have less uniform surface gloss.

To insure heat resistance SatUSply is controlled during manufacture to pass two tests. One test utilizes the penetrating heat of melted wax at 400° F. for a period of three minutes. To insure good contact with the SatUSply, some of the wax is poured on the laminate surface, and the pan containing the remainder of the hot wax is placed on this spot. In the other test, dry heat is applied to both sides of the laminate by means of heated platens at 400° F. which are closed on the SatUSply for 30 seconds. The first test represents field conditions encountered where hot frying pans contact the laminate, and the second test is an arbitrary one to establish the continuity and strength of resin fill between the layers of paper reinforcement.

The resistance of SatUSply to stains of a physical nature, such as tincture of iodine, other spirit-carried colors, etc., is excellent. Although paper-grade SatUSply is not yet recommended for outdoor applications, resistance to ultra-violet radiation is good; the laminate withstands with very little yellowing 100 hours in the Atlas Fadeometer. A service installation on a screened-in porch table is performing very well.

Application and Installation

At present SatUSply is sold mostly for installation on interior horizontal surfaces. We are more interested in obtaining satisfactory performance rather than in extending the market too fast; walls and other vertical surfaces and exterior surfaces are still being held in the development class. Many types of surfaces have been and are being covered successfully, including kitchen tables, cabinets, and sinks, bars, restaurant tables, laboratory benches, store counters, shipping room and manufacturing tables, desks, and dinette and library tables.

Most indicative of SatUSply's wear resistance is a shipping room table in the local post office which was covered March 1945, and is still in use. All sizes and shapes of packages, some bound with wire or metal corners, are thrown on this surface and then slid over and off the edge of the table. In this case the SatUSply was mounted on the oak boards which formed the previous surface, although they had to be thoroughly sanded first since wear had badly chipped and splintered them. We usually do not mount SatUSply on lumber, but this was a special construction of a thickness that would cover the butt joints and withstand the expansion of the oak base. Store counters and kitchen work tables in service since 1946 also attest the ability of SatUSply to withstand wear.

For proof of SatUSply's resistance to staining in service we have installations in the laboratories and emergency work rooms of two local hospitals, one of which has been covered for almost two years. An unsolicited letter from a medical official of the State of Indiana says how pleased they are with the material substantiates our own opinion which is based on periodic examinations. In hospitals the staining effects of body fluids, chemicals, and dyes are a constant problem, and easy cleaning is a requisite of all surfaces. Applications of SatUSply on restaurant tables, bars, and sink tops in service for as long as 2½ years have also withstood staining.

Special designs and colors have been incorporated into SatUSply on small amounts of material for special applications (see Figure 2). Some of these applications have been in service for four years and prove that such custom work is

Fig. 2. Example of Special Design Incorporated into SatUSply

entirely feasible without sacrificing permanency. The variation in designs include advertising as well as personalized and stylized motifs.

One particular advantage of SatUSply surfacing is that it can be applied at the point of use; it is unnecessary to move to a fabrication plant for surface treatment all or part of the object to be covered. In some cases we have covered chipped surfaces of harder variety plastics on the job by merely removing the molding, applying a size coating, and then laying down the SatUSply. Even bending can be done on the job when SatUSply is being fitted to corners or partly up walls to form a continuous splashboard on sinktops.

SatUSply is now being supplied to the trade with the bonding agent already applied to the back surface at the factory. To apply the material, the back is freshened with the proper solvent and placed, when ready, on the properly prepared base material. The three main factors in satisfactory application are (1) choice of SatUSply for the job, (2) timing of bonding agent reactivation, and (3) contact of all parts of the sheet with the base material.

The distinguishing features of SatUSply which make the foregoing possible are its pliability and continuous length. An outgrowth of making thinner decorative laminates by the continuous contact pressure process, pliability of the laminate allows it to be rolled into neat packages which can be handled by one man for any practical sized surface. The continuous length of SatUSply minimizes seams in long unbroken surfaces, such as the 25-foot long bar shown in Figure 3.

The following grades of SatUSply are available for mounting on various base materials: Metallic—X Grade 0.020-inch thick; and Plywood—Y Grade 0.030-inch thick and—X Grade 0.040-inch thick. All grades are available in both satin and gloss finishes.

Since SatUSply is not too dense to prevent permeation by moisture and is not curled when manufactured, the conventional balancing of tabletops on the back side is not necessary. We do recommend, however, the use of a seal coat of lacquer or other suitable material on the back of moisture-sensitive bases instead of the customary and expensive second laminate.

Conclusions

The foregoing descriptions and statements are not intended to imply that SatUSply is easy to manufacture, merchandise, and use. On the contrary, it is very difficult to process polyester resins continuously and maintain the balance between paper and resin while simultaneously obtaining optimum polymerization of the resin. The same optical phenomenon which magnifies and enriches the colors of SatUSply also magnifies any imperfections of paper or processing and often results in areas which must be scrapped. It has taken a good deal of money merely to work out and produce the most economically sound combinations of raw materials into a useful laminate and make a going business of it. We are confident, however, that SatUSply is just at the threshold of its wide potential utility, and that it will eventually hold a prominent place in the surfacing industry.

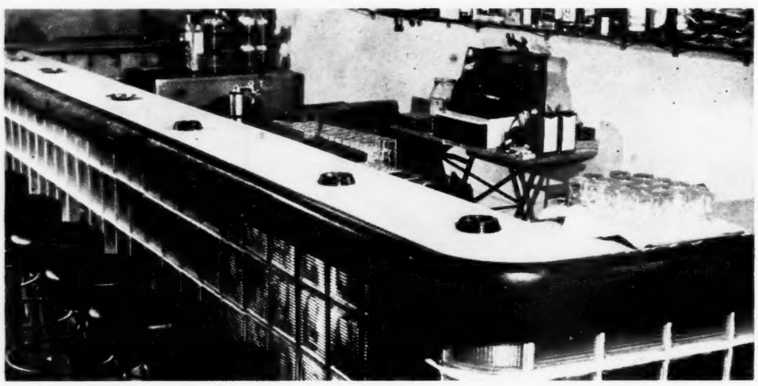


Fig. 3. 25-Foot Long Bar Having Continuous SatUSply Surfacing

Plastics Problems Discussed at SPE Sections' Meetings

A TALK on "Selection and Maintenance of Hydraulic Presses," by Adolphe J. deMatteo, assistant chief engineer, Watson-Stillman Co., featured the May 10 dinner-meeting of the New York Section, Society of Plastics Engineers. Some 45 members and guests attended the meeting, at the Hotel Shelburne, New York, N. Y.

Mr. deMatteo's paper was similar to his article in our March issue (page 732), except for a further elaboration on injection machines. The speaker described and illustrated the relative advantages of both horizontal and vertical injection machines and noted that the trend in injection is toward horizontal machines of 60- and 72-ounce capacity, with some demand for even larger machines. Using slides as illustrations, Mr. deMatteo discussed the principles of press operation, construction, selection, and maintenance, covering compression, transfer, and injection presses.

In the business session preceding the talk, reports were heard from the secretary-treasurer and the various committee chairmen. Table favors were donated by Noma Electric Corp., and there was a drawing for door prizes contributed by Harold Schwartz, Empire Brush Works, Inc., and Nicholas Fasano, Washington Molding Co., Inc.

Necessity of Design Improvement

Approximately 62 members and guests of the Philadelphia Section attended a regular dinner-meeting on April 19 at the Franklin Institute, Philadelphia, Pa. Featured speaker was Carl Sundberg, Sundberg & Ferrar, Inc., who discussed "Design Improvement for Salability and Function of Plastic Items."

Mr. Sundberg stated that good appearance is the first rule in good merchandising since good design is obvious to the eye of the purchaser; while good engineering is apparent only after a period of use. A comprehensive design program should not necessarily limit itself to design of a product, for an easily recognized style applied to all of a company's activities soon becomes a well-known trade mark. In their efforts to design better products, designers are turning more and more to the use of plastics, and there is hardly an industry from ship building to toy manufacturing in which plastics have not been used to advantage by the designer. Although a comparatively new material, plastics is rapidly becoming accepted as another basic material like steel, wood, glass, and paper, and can often do a specific job much better than these old, recognized materials.

New Machine to Mold Thermoplastic Parts

A regular joint dinner-meeting of the Chicago Section, SPE, and Midwest Chapter, SPI, took place on May 11 at the Builder's Club, Chicago, Ill., with some 175 members and guests of the two groups attending. Speaker of the evening was Louis H. Barnett, president of Loma Plastics, Inc., who discussed "A New Approach to Large Thermoplastic Castings."

The first part of Mr. Barnett's talk covered the construction and the operation of his company's new 56-ounce machine for molding large thermoplastic parts. The heart of the new machine is a preplasticizing chamber where the raw material is heated to the liquid state. A unique feature of the process is the use of the liquefied plastic as a lubricant by allowing it to escape along

the plunger during the stroke. Temperatures of 450-475° F. are ordinarily used for molding in the machine, and polarized light tests indicate that parts produced are much more freer from strain than when produced on conventional molding machines.

The second portion of the talk covered "pin point" gating, employing a hole about 0.017-inch in diameter and 0.156-inch long as the sole inlet for the plastic to flow into the mold. Although this method violates many recognized rules for mold construction, it does work and produces parts having fewer weld lines and strains. The process employs a molding pressure about 15% above standard pressures, and it is believed that the frictional heat developed by forcing the plastic through the small gate gives better plasticization and better flow properties than conventional methods. Polystyrene, cellulose acetate, and cellulose acetate butyrate have been molded by the "pin point" method, and other thermoplastics having similar molding properties are also expected to give satisfactory results. Some pearlescent effects which can be obtained with this type of gating are much more beautiful than those obtained by conventional means. Large objects can be molded by using several gates arranged in a pattern, and the method is also applicable to multiple cavity molds.

The talk was preceded by a cocktail hour and dinner and was followed by a showing of the sound film, "From Your Seat on the First Base Line," describing the 1948 World Series.

Wilcox Discusses Molding, Extruding

Approximately 65 members and guests of the Western New England Section, SPE, attended a regular dinner-meeting May 4 at the Hotel Sheraton, Springfield, Mass. Speaker of the evening was Norman Wilcox, General Electric Co., who discussed "Recent Trends in Automatic Hot Molding, Low Pressure Laminating, and Nylon Extrusion."

In discussing automatic transfer molding, Mr. Wilcox gave preheating as the primary problem and cited four common preheating methods, as follows: (1) infrared lamps, whereby material can be heated to 220° F. without adhesion to the conveyer; (2) radio-frequency heating of powder in containers, which may result in nonuniform heating because of the difference in properties between material and container; (3) steam vapor method, which is commonly used; and (4) heating by mechanically working the material, as by forcing the material through a small orifice under high pressure. In automatic molding, the speaker recommended the use of a very fast acting press with a rapid closing speed to reduce the molding cycle time. Positive methods of extraction are necessary together with a rapid means of ascertaining complete extraction of molded parts.

On the subject of low pressure molding, Mr. Wilcox outlined common methods of preforming and molding, using as an illustration the procedures involved in molding a boat hull. In discussing nylon extrusion, the speaker noted that manufacturers are turning from oil to electric heat in order to obtain the required high heat of 500° F. Nylon is usually extruded directly into water, the temperature of which must be closely controlled since the extruded nylon has no "body" and must be frozen to the shape and dimensions required. Mr. Wilcox recommended the use of a salt bath to remove film from the extruding worm and to prevent adhesion of the nylon to the worm.

In the business session preceding the talk, the members voted to hold either a clambake or golf outing in place of the regular June meeting, and President Sherwood L. Young, C. F. Church Mfg. Co., appointed the following committee to handle arrangements: Emil Marciniak, A. G. Spalding & Bros., Inc.; Richard Plichta, Noma Electric Corp.; and Wesley Larson, DeBell & Richardson.

Vinyl Plastisols and Organosols

A three-speaker discussion of "Vinyl Plastisols and Organosols" featured the May 2 joint dinner-meeting of the Southern California Section, SPE, and Pacific Coast Section, SPI. Approximately 89 members and guests of the two sections attended the meeting, held at the Officer's Club, Los Angeles. Speakers on the program were Ray E. Bitter, B. F. Goodrich Chemical Co.; Clayton I. Spessard, Bakelite Corp; and Kenneth W. Woodson, Permalite Plastics Co.

Speaking on "Vinyl Paste Resins," Mr. Bitter briefly reviewed the history of vinyl resins and the development of vinyl paste. The preparation of a typical paste was described, together with a discussion of some of the problems involved, including removal of occluded air, dilatency, and thixotropy. After reviewing the properties of vinyl pastes, the speaker displayed and described typical applications including casting, sheeting and fabric coating, wire coating, spray tank linings, and others.

Mr. Spessard stated that vinyl resin dispersions, more commonly termed organosols and plastisols, have afforded very practical processes for production of high quality coated fabrics, coated paper, unsupported film dip goods, and many other items. The technology of formulation and applications of organosols were described in detail, with slides and samples of finished products shown to illustrate the talk.

Mr. Woodson dealt with "Plastisols—Compounding and Uses" and emphasized the importance of proper formulation. The effects of various contaminants were described, and samples shown to illustrate the effects of variations in formulation. Despite extreme care in selecting basic materials for a specific end-use, the mixing step to obtain the dispersion must be properly executed if satisfactory results are to be obtained.

Dow's New Thermoplastics

A talk on "New Thermoplastics at Dow," by R. W. Van Sickle, Dow Chemical Co., featured the April 11 dinner meeting of the Upper Midwest Section, held at Coffman Memorial Union, University of Minnesota, Minneapolis, Minn.

Mr. Van Sickle gave an interesting summary of new thermoplastic molding powders at Dow, listing the following important factors in these developments: (1) lowered cost; (2) reduced crazing by reducing volatile content and reducing strains in molded parts; (3) reduced contamination; (4) improved moldability, since Styron 666 has increasing molding temperature and pressure ranges; (5) improved light stability, new powders such as Styron 637 have no perceptible yellowing; and (6) improved heat resistance, as exemplified by Styrons 683 and 671.

In discussing mold design, the speaker noted that many molding problems are directly related to mold design and made the following suggestions: (1) use thicker edges for reduced air trapping; (2) use the short shot method for studying mold design; (3) mold cooling is important with tricky designs; (4) mold sticking is often caused by designs which stress mold walls excessively, and use of lubricants reduces molding pressure and thereby gives better release; (5) gate balance is often an important factor in proper molding; and (6) restricted gating is the coming thing since it allows more uniformity of pressure in the mold, gives greater density and less strain in the product, and permits wider molding temperature ranges.

The May 9 meeting of the Upper Midwest Section featured a dinner and trip through the Minneapolis-Honeywell Regulator Co. plant at Minneapolis, Minn. Some 54 members and guests took part in the tour, which ended in the company's plastics department and laboratory. The trip was arranged by S. K. Moxness, chief process engineer for the company and a director of the Section. Following the summer recess the group will hold its next regular meeting on October 10. Meeting place and program will be announced at a later date.

Thiessen Addresses Cleveland-Akron Section

The Cleveland-Akron Section held a dinner-meeting April 25 at the Cleveland Club, Tudor Arms Hotel, Cleveland, O. Approximately 35 members and guests attended the meeting, which was preceded by an informal cocktail hour and which featured a talk by Gilbert Thiessen, Koppers Co., Inc., entitled "Where Do We Go from Here?"

Using slides to illustrate his talk, Dr. Thiessen examined the raw material sources for the various plastic materials and discussed the pressures exerted on these sources by other industries requiring the same raw materials. The speaker also pointed out that some members of the plastics family must compete with one another for the same basic raw materials. Following the talk was a showing of a sound film on nylon through the courtesy of E. I. du Pont de Nemours & Co., Inc.

Sells Cold Plastics Business

THE sale of General Electric Co.'s cold molded plastics business to the Garfield Mfg. Co., Garfield, N. J., was announced on May 7 by GE's chemical department, Pittsfield, Mass., as the final phase in the closing of the department's Meriden, Conn., plastics plant. The transaction includes inventories, formulations, engineering specifications, and some equipment from Meriden.

General Electric is discontinuing production of cold molded plastics in order to give more emphasis to the growth of the company's thermosetting and thermoplastic molded and laminated lines. Garfield, which has been producing cold molded plastics similar to the GE line since 1908, will begin immediate transfer of equipment and customers' molds from Meriden on a planned schedule arranged so as not to interfere with regular deliveries to GE's former accounts.

New Durez Compounds

TWO new Durez phenolic molding compounds have been announced by Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y. The first, Durez 13527, can be molded at one-third the pressure normally required for compression mold-

(Continued on page 364)

Scientific and Technical Activities

Recent Developments in the Field of Compounding

AS AN innovation in India Rubber World we are planning to present twice each year short summaries on recent developments in various branches of the rubber industry and its technology and also a short summary on the plastics industry, of which the accompanying short articles are representative.

These summaries are prepared by members of our Editorial Advisory Board or by other well-known experts in the several fields and should be of value to our readers in providing frequent and up-to-date checks on trends in these fields.

Recent developments in the sole and heel branch of the rubber industry were included as part of our News of the Month department in May under the heading of Industry Trends.

THIS brief summary, which it is hoped will become a regular feature of India Rubber World, is intended to highlight developments in the field of compounding in the recent past. It is not intended to cover the published literature or all the new developments which might occur. It is intended to discuss developments in new materials—rubbers, resins and compounding ingredients—testing methods and product improvements which seem to be significant.

One of the serious weaknesses of the vulcanizates of natural rubber, GR-S, and the nitrile rubbers which had successfully resisted attempts to remedy by chemical means is the property known variously as sunlight cracking, exposure cracking, atmospheric cracking, and, probably more correctly, ozone cracking. It is true that a fairly satisfactory solution to the problem, when exposure is static, had been developed many years ago, using waxes which would bloom to the surface forming a coating impenetrable by ozone. This solution, however, was worse than useless for dynamic exposures. It is also true that several materials which did not depend on blooming to the surface had given some promise on the problem, but these materials were objectionable because of toxicity or staining.

Two recent developments, while if not final solutions to the problem, at least offer hope of a chemical means by which this perplexing problem might be solved. One product, marketed as NBC (nickel dibutyl dithiocarbamate) by du Pont as an inhibiter of dynamic exposure cracking for GR-S, exhibits marked inhibition of both static and dynamic cracking in GR-S vulcanizates. It is also somewhat effective in natural rubber and nitrile rubber vulcanizates, but only slightly effective in clay loaded stocks based on these rubbers. It may have an adverse effect on aging, particularly when used with natural rubber.

The other product is 2-6 di-t-butyl 4 methyl phenol, marketed as such by The Koppers Co., and under the trade name of Ional by Shell and Deenax by Standard Oil of New Jersey. This is a material having fairly good antioxidant properties with relatively good non-staining properties and an appreciable effect in retarding ozone cracking.

The appearance of these two materials will, no doubt, act as a stimulus to other investigators to seek still further improvements in this field.

A tool for the more precise study of this phenomenon was suggested by Crabtree and Kemp[1] several years ago. Their apparatus consists essentially of a mercury vapor lamp for producing the ozone, a test chamber in which the ozone-containing air is circulated and in which the temperature is controlled, facilities for sampling the air in the test chamber and analyzing for ozone concentration. Their suggested ozone concentration of 25 parts per 100,000,000 is somewhat higher than occurs normally and serves to make the test more rapid than outdoor exposure, but is not so high that ability to discriminate between compounds is lost. A number of laboratories now have this apparatus, and for the first time a reliable test method is available for studying this phenomenon.

This tool and the evidence that some progress has been made toward the solution of this problem will without doubt be responsible for further progress in this field.

[1] *Ind. Eng. Chem.* (*Anal. Ed.*), 18, 769 (1946).

Recent Developments in Reclaimed Rubber

BY INVITATION of our Department of State the reclaimed rubber industry of the United States was represented at the sixth meeting of the Rubber Study Group held in London, March 28-April 1.

The importance of the rubber reclaiming industry is reflected by its large productive capacity of 325,000 long tons per year on a six day-week basis of 24 hours per day. In 1948 domestic consumption was 261,000 long tons, and exports were 11,000 long tons in addition. This domestic consumption was 26.8% of the total domestic consumption of natural rubber plus GR-S.

Reclaimed rubber is used because it permits an article of specified quality to be made at minimum cost. This low cost is due to savings made in processing as well as in material. Processing savings prevail regardless of the price of new rubber, which is now rather low in relation to the price of reclaimed rubber. The price of reclaimed rubber is low when compared with the price index of all semi-manufactured articles. The last price increase on reclaim was made in the Fall of 1948.

The supply of tire scrap is abundant owing to the very large sale of replacement tires since the war.

The second-line tire is now being widely advertised for the first time since the war. As a rule, this tire contains higher proportions of reclaim than the standard first line, both in the carcass and in the undertread. The tread itself may also contain appreciable proportions of reclaim. The value in miles per dollar is good.

A new reclaiming process involving a very short time of heating or devulcanization has been developed and commercialized, and is said to result in superior quality.

The drive for lower costs on automobiles seems to be beginning and may eventually result in elimination of fancy colored rubber products. Some of these, such as floor mats, have been a headache to the rubber goods manufacturer as well as to the reclaimer for the reason that the supply of light-colored scrap rubber from which light-colored reclaim is made is scarce and also because of the demand for non-staining rubber products. Good progress has been made in the development of minimum staining reclaims, but a black auto mat costs less than a colored one and is just as good.

Data have recently been published on the resistance to oven and oxygen bomb aging of compounds with and without reclaimed rubber. The proper use of reclaim was shown to improve the age resistance of both natural rubber and GR-S compounds, and the currently available reclaims containing GR-S hydrocarbon were shown to be better in this respect than the prewar materials which contained only natural rubber.

Recent Developments in the Physics of Rubber

THERE is a convergence of interest apparent in the use of sonic and ultrasonic wave measurements as a means of relating the mechanical properties of polymers to molecular characteristics. Techniques developed in the last year or so[1] for measuring the velocity and attenuation (absorption) of sound waves in rubber foreshadowed the results which are now being published as these methods are applied in a systematic way to secure new information on molecular constellations, rigidities, and slippage in polymers and plastics. The sound frequencies employed range from low audible vibrations to ultrasonic vibrations as high as 30 megacycles per second for which techniques borrowed from radar are used.

To illustrate the breadth of interest in these new methods and the diversification

[1] A. W. Nolle and S. C. Mowry, *J. Acoust. Soc. Am.*, 20, 432 (1948); A. W. Nolle, *J. Applied Phys.*, 19, 753 (1948); T. L. Smith, J. D. Ferry, and F. W. Schremp, *Ibid.*, 20, 144 (1949).

of physics research on high polymers, papers have been presented on the subject in the last few months from the laboratories of the University of Texas, University of Notre Dame, University of Wisconsin, Ohio State University, Cornell University, Bell Telephone Laboratories, Monsanto Chemical Co., E. I. du Pont de Nemours & Co., Inc., and Imperial Chemical Co., Ltd., in England.

The sonic methods are applicable both to solid polymers and to polymer solutions. At audio and ultrasonic frequencies, polymer solutions have sufficient shear elasticity to propagate tranverse waves. Ordinary sound waves are longitudinal, but special techniques have been developed for generating shear waves which permit a notable simplification in the interpretation of the results.

The most important information secured involves the correlation of the sound velocity and absorption with frequency and temperature. The velocity is dependent on the dynamic elastic modulus for the particular type of wave studied, and the absorption is dependent on molecular friction and slipping. In general, it is found that the sound velocity increases with decreasing temperature. The sound absorption, measured over a range of temperature, usually has a peak value at one temperature characteristic of the polymer. This peak shifts to higher temperatures as the frequency is raised. This type of behavior is characteristic of a molecular structure which yields or slips under applied stress.

The work is at the stage where pertinent data are being reported on a survey of the effects with different polymers and variables in polymer structure and composition. Some new implications from the results of importance for the molecular theory of polymer structure are already apparent. It is to be expected that a better understanding of the molecular structure of polymers and the dependence of the mechanical properties on this structure will be obtained. Such a broad advance in knowledge is almost certain to have significant practical consequences. There is a challenge here for everyone concerned to be aware of this new knowledge and to use it to the best advantage.

Industrial Summary

AS PART of an expanded program of information service, the technical information division of the Georgia Tech Engineering Experiment Station, Atlanta, has begun the preparation of a "Monthly Summary of Industrial Developments (Related to Petroleum Processing)," sponsored jointly on a non-profit basis by several companies. Other petroleum, petroleum chemical, and petroleum engineering companies have announced tentative interest in joining in the sponsorship of this bulletin, which is not available to any individual, company, or library except on a full participating sponsorship basis. Each sponsor designates the number of copies he desires.

The Summary, published during the first week of each month, constitutes a semi-technical and economic coverage of developments noted in a continuous survey of the literature received by the twenty-fifth of the preceding month. At present, one daily, 17 monthly, and seven weekly periodicals are scanned for pertinent happenings. The first issue of the Summary, issued in May, was 32 pages long, but future issues are expected to be shorter. Editor is B. H. Weil, division chief.

Dinsmore at Ontario and Buffalo Groups' Joint Meeting

THE annual joint meeting of the Ontario Rubber Section and the Buffalo Rubber Group was held May 6 at General Brock Hotel, Niagara Falls, Ont., Canada, and was attended by more than 250 members and guests of the two local groups. R. P. Dinsmore, vice president in charge of research and development, Goodyear Tire & Rubber Co., was the speaker of the evening, and he chose as his subject "cold" and hot rubber.

Among the guests present at the meeting were H. I. Cramer, Sharples Chemicals, Inc., and F. W. Stavely, Firestone Tire & Rubber Company., chairman and chairman-elect, respectively, of the Division of Rubber Chemistry, A. C. S.; and John Ramsey, Gutta Percha & Rubber Co., Ltd., and J. T. Black, Polymer Corp.; vice chairman and secretary-treasurer, respectively, of the Rubber Division, C. I. C.; and Gordon Smye, Firestone Tire & Rubber Co. of Canada, Ltd.

Dr. Dinsmore first pointed out that the immediate situations with respect to synthetic rubber in the United States and in Canada are somewhat different. Fundamentally, however, the basic question applies to both, that is, whether a general purpose synthetic can be made to stand on its own feet in the world's rubber markets, or whether, for security reasons, it must be supported by some kind of government control.

Under present price structures natural rubber can be delivered in New York at a cost below which synthetic can be presently manufactured. Last year, he said, the United States consumed some 1,069,000 long tons of rubber, of which 32%, or 345,000 tons, was GR-S.

Some 110,000 tons of synthetic were used voluntarily by the industry without government order, since the supply of natural rubber was still limited. Even so, the GR-S consumption was down about 100,000 tons from the amount used the preceding year. With crude rubber showing a decline in price, the pressure to use more natural rubber is increasing, he added. Hence the question of quality of the synthetic produced is of prime importance.

Dr. Dinsmore stated that he found considerable confusion among laymen and rubber technologists alike, partly because of varying opinions as to the actual quality characteristics of the new low temperature GR-S or "cold rubber", and this confusion is aggravated by a failure to analyze complete effects in relation to those of natural rubber.

Experience, thus far, with cold weather skidding of tires indicates that "cold rubber" is worse than regular GR-S. Hot weather cracking, at normal driving speeds is, as far as he knows, still insufficiently determined, the speaker further declared.

Summarizing his points on "cold rubber" possibilities, Dr. Dinsmore stated, "the material, like regular GR-S, requires carbon black loading to have sufficient toughness even for carcass stocks. Thus, even though it is more resilient than the old GR-S, this improvement is not sufficient to overcome the handicap caused by the use of black, especially for large tires.

"Even in treads, the wear improvement accomplished with "cold rubber" only surpasses natural rubber when one certain type of black is used, and then any advantage in resilience over the conventional GR-S is lost.

"There is no doubt," the speaker added, "that, when used with special carbon blacks, 'cold rubber' gives better tread wear. We have yet to learn whether other drawbacks will offset this advantage over natural rubber, or indeed, whether similar effects cannot be produced with natural rubber itself."

Dr. Dinsmore took a more positive stand on the possibilities of synthetic rubber as a component in rubber-asphalt road surfacing material. He mentioned the work of the Dutch Rubber Foundation and the visit to this country at the present time of Dr. Houwink, the director of the Dutch organization, to give several talks on this subject, with special reference to the use of powdered natural rubber in road construction in Europe.

He reviewed his company's experimental work on rubber-asphalt paving in which both natural and synthetic rubber powders were applied as thin top finish coats comparable with those placed on the Netherlands roads.

With these tests looking promising in their initial stages, Goodyear, in an agreement with the City of Akron, placed more than a mile of rubber-asphalt paving down on a main thoroughfare last year.

In part of the rubber mixture 5% of rubber, based on the weight of asphalt, was used; and in the remainder 7½% was used. Rubber from GR-S latex was used throughout. Tests were made on penetration, softening point, ductility, and the effect of freezing weather on possible shattering, all with positive results, indicating that the tests were moving in the right direction, Dr. Dinsmore stated.

Wool Wax Products

THE availability in bulk quantities of new water-soluble polyoxyethylene condensation products of wool wax alcohols has been announced by Croda, Ltd., Croda House, Snaith, Goole, Yorks., England. These materials are non-ionic surface active agents consisting of mixed polyoxyethylene glycol ethers of cholesterol, lanosterol, and straight chain alcohols. The new materials represent an entirely new departure in detergents and wetting, dispersing, emulsifying, penetrating, and spreading agents. The polar portions of their molecules will be largely due to the sterols, steroids, and triterpene alcohols condensed with the alkylene oxide, as distinct from straight chains of the higher aliphatic alcohol ethers previously available.

Grades of varying polymerized ethylene oxide content will be produced, but the first to be introduced contains the equivalent of 130-140 molecules per molecule of condensate. The new products are being sold under the trade name, Polychol, and are available in two grades: Grade LM (mono-ethers); and Grade LD (di-ethers). The materials are available in solid anhydrous form and in 50% aqueous solutions.

"Advances in Rubber" Available

THE General Tire & Rubber Co., Akron, O., has announced the availability of a limited number of reprints of the article, "Advances in Rubber, 1947-1948," by L. W. Brock, G. H. Swart, and E. V. Osberg. This review article appeared in the January through April, 1949, issues of India Rubber World. Requests for copies of the reprint should be addressed directly to General Tire.

New Accelerator

ETHYLAC, a new self-activating primary accelerator for the rubber industry, has been developed by Sharples Chemicals, Inc., 123 S. Broad St., Philadelphia 9, Pa. The new material combines high activity with good delayed action and good processing properties. Chemically 2-benzothiazyl-N,N-diethylthiocarbamyl sulfide, Ethylac thus combines the important chemical structures of both thiazole and thiuram types of accelerators. It is practically dust-free, is non-discoloring, requires no special handling precautions, and has excellent storage stability, it is claimed.

A light-yellow to tan-colored solid with a characteristic odor, Ethylac has a specific gravity of 1.27, melting point of 71° C. minimum, volatile content of 0.5% maximum, and a calculated molecular weight of 282.4. Under development for two years, the new accelerator has given successful factory runs and is now available in commercial quantities. A 16-page booklet, Report 49-4, entitled "Sharples Ethylac," gives laboratory test data on use of Ethylac in various natural and synthetic rubber stocks.

"Preview of Progress"

SOME 199 members and guests of The Los Angeles Rubber Group, Inc., attended a regular meeting on May 3 at the Hotel Mayfair, Los Angeles, Calif. Guest speaker at the afternoon technical session was Walter A. Dew, E. I. du Pont de Nemours & Co., Inc., who gave a "Preview of Progress."

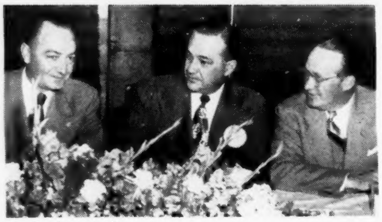
Dr. Dew discussed and demonstrated many of the newest developments in modern industrial chemistry, some of which are still in the experimental stage, and covered their effect in raising our standard of living.

"In our economy where the consumer exercises freedom of choice, competition forces improvement in goods and services at prices which the consumer demands," the speaker declared.

This improvement stems from four interacting elements in industry: research, capital, production, and distribution. Dr. Dew cited the history of cellophane to show how the system works, pointing out how the material has changed our marketing methods and contributed to public health. The story of nylon also demonstrates how the standard of living is raised through industrial developments. The four factors on which this standard depends were given by the speaker as natural resources; inventive ability; mass production techniques; and "the freedom to imagine, to make, and to distribute these products." Some of the other materials mentioned were titanium metal, polyethylene plastics, and Orlon acrylic fiber.

A cocktail hour and dinner followed the technical session. After-dinner speaker was Randolph Van Nostrand, Merchants & Manufacturers Association, whose topic was "This Is Your Problem." The speaker treated of the advantages of the United States, as compared with other countries, and ascribed these advantages to the following fundamental principles: the right of individual freedom; the right of private property; the free market which determines what will be made and sold and its quality; profit and wage incentives; competition which results in research and development; and the government acting as a referee only in business.

The dinner-meeting was The B. F. Goodrich Co. night, and Larry Keltner, Goodrich plant manager, was in charge of the meeting and introduced many Goodrich men to the assemblage. As a special feature, 20 students from California Institute of Technology, under the guidance of Fran Beiter, Golden West Rubber Mills, were taken on tours through the Goodrich and W. J. Voit Rubber Corp. plants during the afternoon and then were guests of the Group at the technical and dinner sessions.


A. R. Hromatka

Present at the May 3 TLARGI Meeting Were (*L. to R.*): L. R. Keltner, Goodrich; Group Chairman Chas. Churchill, Sterling Rubber Products Co.; and G. Gundaker, Goodrich

Door prizes donated by Goodrich were won by the following: Art Swanson, L. A. Rubber & Asbestos Works; Al Pickard, Braun Corp.; A. R. Kemp, consultant; Bill Haney, Kirkhill Rubber Co.; Y. Van Patter, Carem Mfg. Co.; Herb Griley, Griley Transport Co.; Joe Wexelberger, Plastic & Rubber Products; and Dale Young, Rubbercraft Corp. of Calif. A special prize donated by L. J. Tillotson Rubber Co. was won by Mason Paine, Firestone Tire & Rubber Co.

New Hydrocarbon Samples

SIX new NBS standard hydrocarbon samples have been announced by the National Bureau of Standards, bringing to 102 the number of such compounds now available for calibrating analytical instruments and apparatus in the research, development, and analytical laboratories of the petroleum, rubber, chemical, and allied industries. These samples have been prepared as part of a cooperative program of the Bureau and the American Petroleum Institute, begun in 1943. They follow:

NBS Sample No.*	Compound		Amount of Impurity,† Mole %	Unit Vol.‡ Ml.
	Formula	Name		
568-5S	$C_{16}H_{34}$	*n*-Hexadecane	0.06 ±0.04	5
528-5S	C_6H_{12}	cis-3-Hexene	0.13 ±0.08	5
569-5S	C_5H_8	1, 2-Pentadiene	(0.34 ±0.15)§	5
570-5S	C_6H_{10}	2, 3-Dimethyl-1, 3-butadiene	(0.06 ±0.03)§	5
571-5S	$C_{10}H_{14}$	1-Methyl-4-isopropylbenzene	0.05 ±0.03	5
572-5S	$C_{11}H_{16}$	1-Methyl-E-tert-butylbenzene	0.08 ±0.05	5

*The designation "5S" indicates a sample of five ml. sealed "in vacuum" in a special pyrex glass ampoule with internal "break-off" tip.

†Purity evaluated from freezing point measurements, as described in *J. Research NBS*, 35,355 (1945), WP1676.

‡Tolerance approximately ±10%.

§Polymer formed while sealed may be removed as residue by simple vaporization of the sample "in vacuum" at an appropriate temperature.

Instructions for transferring standard samples of hydrocarbons "in vacuum" are available upon request. A complete list of NBS standard samples of hydrocarbons, together with instructions for ordering, may also be obtained from the National Bureau of Standards, Washington 25, D.C.

New Resinous Hydrocarbon

KENFLEX, a new type of synthetic resinous hydrocarbon of unusual stability and extremly low electrical loss, is being made commercially by Kenrich Corp., New York 5, N. Y., under arrangement with Socony-Vacuum Oil Co., Inc., developer of the material. Available in several grades, the product is made by catalytic condensation of specific alkyl naphthalenes, followed by purification and high vacuum distillation.

Kenflex A is derived from dimethyl naphthalenes; has a drop melting point of about 160° F.; viscosity of approximately 300 centistokes at 210° F.; an initial boiling point in excess of 400° F. at two-millimeter pressure; and a dielectric dissipation factor of about 0.0025 at 212° F. Allied materials of different viscosities and melting points can be made by selection of the proper alkyl and cycloalkyl substituents. For example, Kenflex B has a drop melting point of about 80° F.; viscosity of 60 centistokes at 210° F.; initial boiling point over 400° F. at two-millimeter pressure; and dielectric factor of 0.005.

Because of their high degree of aromaticity, Kenflex products exhibit outstanding compatibility with a wide variety of resins. Kenflex products have tackiness, non-volatility, and electrical properties comparable to the polybutenes, but are opposite in viscosity index and solvent power. They may be blended with most oils or resins to give compositions which will impregnate or extrude easily at processing temperatures and exhibit highly viscous or tough characteristics under usual operation conditions. Among the recommended applications for Kenflex are vinyl wire insulation, electrical cable filling, potting and caulking compounds, rigid vinyl moldings, adhesives and sealing compounds, vinyl floor tile and composition rollers, hot melt coatings, and paints and varnishes. In rubber compounding Kenflex gives improved processing without softening. The material acts as a dispersing aid and anti-bloom, and gives stocks that are smooth, hard, and tough.

Translators' Directory

A DIRECTORY of Translators has been established by the science-technology group of Special Libraries Association, 31 E. 10th St., New York 3, N. Y. The Directory is operated as a free service to bring together clients having translation problems and language specialists competent in various fields of science and technology. The Directory has been housed at the Southwestern Research Institute, San Antonio, Tex., under the management of Wayne Kalenich. Individuals or firms needing qualified translators are invited to contact Mr. Kalenich, and translators are urged to place their qualifications on file with the Directory. While no data concerning interpreters have been collected as yet, such information is solicited.

Mr. Kalenich also conducts the Special Libraries Association Translations Pool, which records the existence of technical translations within private files and the conditions of their loan or purchase. About 3,000 translations have already been indexed in the Pool, and persons contemplating the translation of a technical article are urged to make a preliminary check with Mr. Kalenich in order to ascertain whether such a translation is already available.

Stubblebine on QM Research

A TALK on "Some Aspects of Quartermaster Research and Development," by Warren Stubblebine, research director, chemicals and plastics section, Office of the Quartermaster General, featured the May 17 meeting of the Thiokol Technical Club, held in the conference room of the Thiokol Corp., Trenton, N. J. Approximately 95 members and guests attended the meeting, which was preceded by a cocktail hour and dinner served on the lawn.

Dr. Stubblebine began by discussing the work involved in arriving at requirements for time, temperature, humidity, etc., contained in material specifications. Tests made at Death Valley, Calif., over a period of 30 years showed a daily maximum temperature over the year of 115° F.; while materials stored under a tarpaulin in the sun may reach 150-160° C. Other tests made at Fort Churchill, on Hudson's Bay, showed that temperatures as low as —90° F. may be reached for short periods of time. Slides showing test results were presented, together with other slides dealing with tests in the laboratory and the field on army clothing items under high and low temperature conditions.

The speaker concluded with a discussion of work on polymeric materials capable of retaining their properties at low temperatures. Crude rubber exhibits excellent low-temperature properties and can be plasticized to extreme low-temperature performance, but on aging at —20° F. or lower crude rubber crystallizes to a brittle state which makes it unsatisfactory for use at —70° F. GR-S, GR-S-AC, and GR-S-10 showed similar properties; they do not have good low-temperature properties and cannot be plasticized without extreme losses in tensile strength for operation at —70° F. Butyl has good low-temperature properties and can be plasticized to give flexibility at extremely low temperatures, but it cold flows at the seams of fabricated articles and has a very slow speed of retraction at —70° F. Neoprene cannot be plasticized or formulated for satisfactory use at —70° F. because of extreme hardening and inflexibility when aged at this temperature.

Flexible coatings from modified or plasticized nylon resins are satisfactory for use down to about —20° F., but are unsuitable at lower temperatures. Plasticized vinyls are unsuitable for use at —70° F., but coatings on glass fabric for tentage material have appeared satisfactory. Vinyl pyridine-butadiene rubber has the same low-temperature performance properties as GR-S. Nitrile rubbers containing 75% butadiene or higher exhibited poor low-temperature properties; while rubbers containing less butadiene showed very poor physical qualities. Butadiene-styrene rubbers of low styrene content gave good low-temperature performance and poor physical properties, but polymers of higher styrene content gave increasingly poorer low-temperature performance.

Polyvinyl butyrate is quite similar to vinyl chloride, except that its plasticizers tend to be fugitive and show no promise for low-temperature work. Some silicone rubbers and resins show very good low-temperature properties, but little work has been done on these materials owing to their high cost and poor physical properties. Polyethylene remains flexible at very low temperatures although it stiffens at —30° F., but its difficulty in processing results in little value for coated fabrics. Polybutadiene is the most promising polymer tested despite its poor physical properties since it has excellent low-temperature flexibility and resistance to low-temperature aging. Polyisobutylene has good low-temperature properties, but its inability to be vulcanized makes it unsuitable for fabric coating. "Thiokol" LP-2 showed fair low-temperature properties, but unsatisfactory abrasion resistance and physical qualities. Much work on plasticizers is also being done, but the problem of oil-resistant polymers for use at low temperatures still remains unsolved, and there seems to be little real hope for an early solution, the speaker stated.

Organic Sulfur Samples

THE National Bureau of Standards is now making available high-purity standard samples of organic sulfur compounds to interested laboratories of the petroleum, chemical, and allied industries. These compounds are prepared, under the sponsorship of the American Petroleum Institute, by the Bureau of Mines, United States Department of the Interior, where the compounds are used for the measurement of needed physical, thermodynamic, and spectral properties. A portion of each compound is set aside to provide standard samples for calibration of analytical instruments and apparatus in research, development, and analytical laboratories. As of February 1, 1949, the following compounds have been issued in this program:

NBS Sample No.*	Compound†		Amount of Impurity,‡ Mole %	Unit Vol.§ Ml.
	Formula	Name		
901-5S	C_4H_4S	Thiophene	0.013 ±0.011	5
902-5S	C_3H_8S	2-Thiabutane (Methyl ethyl sulfide)	0.04 ±0.04	5
903-5S	$C_4H_{10}S$	3-Thiapentane (Diethyl sulfide)	0.06 ±0.04	5

*The designation "5S" indicates a sample of five ml. sealed "in vacuum" in a special Pyrex glass ampoule with internal "break-off" tip.

†For nomenclature of these compounds, see *Chem. Eng. News*, 24, 2765 (1946).

‡Purity evaluated from freezing point measurements, as described in *J. Research* NBS, 35, 355 (1945), RP1676.

§Tolerance approximately ±10%.

Instructions for ordering and directions for transferring the samples "in vacuum" may be obtained from the National Bureau of Standards, Washington 25, D. C.

Wiard Discusses Silastic

A TALK on "Silastic—Its Properties and Place among Synthetic Rubbers," by W. A. Wiard, Dow-Corning Corp., was the feature of the May 6 meeting of the Detroit Rubber & Plastics Group, Inc., held at the Detroit Leland Hotel, Detroit, Mich., and attended by 130 members and guests.

Mr. Wiard brought the Group up to date on improvements made in Silastics by Dow-Corning. He exhibited samples of stocks which would withstand temperatures of —180 to +600° F. and demonstrated that Silastics retain their flexibility over this broad range by placing one end of a sample of tubing on a hot plate at 500° F., and the other end in dry ice at —100° F. The Silastic tubing was not affected; while a natural rubber sample similarly treated decomposed on the hot plate and was embrittled by the dry ice.

The speaker also displayed samples of a new Silastic polymer. Although no properties were given, handling tests of the polymer indicated that it had a tensile strength far above 600 p.s.i. and probably approaching that of natural rubber. This new polymer will be available some time in the near future and is expected greatly to increase the usefulness of Silastics, particularly in temperature ranges unsuitable for natural and other synthetic rubbers.

The Group will hold its annual summer outing and golf tournament on June 24 at the Forest Lake Country Club, Pontiac, Mich.

"Cold Rubber" Discussed

FRANK M. McMILLAN, Shell Development Co., was guest speaker at the April 28 dinner-meeting of the Northern California Rubber Group, held at the Hotel Claremont, Berkeley. The meeting was "Shell Night," and an unusually large number of members and guests were on hand to hear Dr. McMillan discuss "Some Experiments on Extending 'Cold Rubber' Tread Stocks with Carbon Black and Petroleum Plasticizers."

Dr. McMillan gave an interesting and informative talk on work being done at Shell with "cold rubber." Graphs showing comparative physical properties of stocks extended with varying amounts of carbon black and heavy petroleum softeners were used as illustrations, together with photographs of road tested tires made from the different stocks.

The technical session was preceded with a short business meeting at which plans for the Group's annual summer outing were discussed. It was decided to hold a golf tournament on the afternoon of June 29, preceding the last meeting before the summer recess. Among the guests of honor at the meeting were Charles H. Churchill, Sterling Rubber Products Co. and president of The Los Angeles Rubber Group, Inc., and a group from the Federal Natural Rubber Research Laboratory at Salinas.

Forecasts 75,000-Mile Tires

A FORECAST of the early development of 75,000-mile tires that will last the average motorist eight years was made by Charles P. Fryling, Phillips Petroleum Co. Speaking before the annual meeting of the Northeastern Section, A. C. S., on May 12 at Massachusetts Institute of Technology, Cambridge, Mass., Dr. Fryling stated that this threefold increase in auto tire life span can be expected to result from further improvements in "cold rubber." He also reviewed the development of "cold rubber" and the processing problems entailed and described the use of polymerization catalysts in low temperature GR-S manufacture.

In a technical session sponsored by the Section's division of rubber and allied substances, papers were also given by Frank R. Mayo, United States Rubber Co., and C. Gardner Swain, M.I.T. Dr. Fryling's address followed the Section's election of officers for 1949-1950, as follows: chairman, Avery A. Morton, M.I.T.; chairman-elect, John T. Blake, Simplex Wire & Cable Co.; secretary, Thomas R. P. Gibb, Jr., Metal Hydrides, Inc.; treasurer, John C. Percival, Monsanto Chemical Co.; and auditor, Frederick S. Bacon, Frederick S. Bacon Laboratories.

"Cold Rubber" Symposium and Other Activities Attract Large Attendance to Boston Rubber Division Meeting

THE program of the fifty-fourth meeting of the Division of Rubber Chemistry of the American Chemical Society, with its symposium of 15 papers on "cold rubber" as well as outstanding papers on a variety of other subjects, the award of the Charles Goodyear Medal to Harry L. Fisher, U. S. Industrial Chemicals, Inc., at the Division banquet, the plant trips, and another meeting of the 25-Year Club, attracted a registration of about 800 members and guests to the meeting held in Boston, Mass., at the Statler Hotel, May 23 through 25.

The papers on GR-S and other copolymers produced at 41° F. and lower temperatures with regard to the effect of these lower than standard polymerization temperatures on the structure, physical properties, and service in tires were comprehensive in scope. By virtue of the work of a special reviewing panel and the cooperation of Walter J. Murphy, editor of *Industrial and Engineering Chemistry*, these papers will be published in the August issue of that A. C. S. publication.

The 25-Year Club luncheon May 23 had about 150 present for an informal get-together and was featured by a surprise presentation of a sterling silver Paul Revere bowl to A. A. Glidden, the member with the longest record of association with the rubber industry (56 years). This presentation was made possible by Godfrey L. Cabot, Inc. Despite certain difficulties beyond the control of the local committee which developed in connection with the clambake at Marblehead on the evening of the twenty-third, about 500 were present at this affair. All those who attended were supplied with "bake" aprons, again courtesy of Godfrey L. Cabot, Inc., and special mention should be made of the du Pont "Blue Sheet" entitled "Compounding and Processing by a New Masterbatch Method," code identification "BL-ONEY," dated 5/23/49, and prepared by G. W. Smith of the du Pont company, local committee member in charge of the clambake.

Plant trips on the afternoon of May 24 also attracted about 100 to each of the plants visited: namely, Boston Woven Hose & Rubber Co., Hood Rubber Co., Simplex Wire & Cable Co., and Dewey & Almy Chemical Co. About 850 members and men and women guests attended the Division banquet in the evening and heard, in addition to Dr. Fisher's medal acceptance address, a talk by Gen. George C. Kenney, United States Air Force, on "Air Power." The suppliers' cocktail party, held just before the banquet and arranged under the committee headed by Owen Brown, Jr., Godfrey L. Cabot, Inc., was a most enjoyable affair.

At the business meeting of the Division on the morning of May 25 the members were informed of the death only a few days before of A. E. Boss, Columbia Chemicals Division, Pittsburgh Plate Glass Co., and during the past month of M. K. Easley, American Zinc Oxide Co., two long-time and active members.

H. I. Cramer, Sharples Chemicals, Inc., chairman of the Division, also announced that the executive committee had decided to arrange, if possible, an international rubber conference at the time of the 1950 fall meeting. Final decision and further details on this event are to be announced at the 1949 fall meeting in Atlantic City, N. J.

25-Year Club Paul Revere Bowl Presentation (*Left to Right*): J. M. Bierer, Owen J. Brown, Jr., A. A. Glidden, J. M. Walton

The 25-Year Club Luncheon

John M. Bierer, Boston Woven Hose, presided as chairman at the luncheon meeting of the 25-Year Club. He announced that as a result of letters and questionnaires regarding qualifications sent to 309 Division members who had expressed their interest in becoming members of the Club, replies had been received from 257. He then asked those present with 30 or more years' association with the industry to rise, and it was evident that about half were in this class. Those with 35, 37, 40, 45, and 50 years with the industry were in turn asked to remain standing until their service period was exceeded, and at the 50-year point, only two members shared the honors, A. A. Glidden, now retired from Hood Rubber Co., and W. E. Kavenagh, Goodyear Tire & Rubber Co. When those with more than 55 years with the industry were asked to remain standing, only Mr. Glidden was left, and it was at this point that Mr. Bierer presented the silver Paul Revere bowl to him in honor of his achievement. As a further surprise feature, small sterling silver Paul Revere bowls were also presented to everyone at the luncheon meeting. A rising vote of thanks to Ralph Bradley and Owen Brown, Jr., of the Cabot organization, for their generosity in making these presentations possible was given at the suggestion of R. P. Dinsmore, of Goodyear.

Mr. Bierer announced that John Coe, Naugatuck Chemical Division, United States Rubber Co., had been selected chairman for the next meeting of the 25-Year Club to be held at the September meeting of the Division in Atlantic City.

The Technical Sessions

In his opening remarks at the beginning of the first technical session on the afternoon of May 23, Dr. Cramer emphasized the tremendous value of research to the rubber industry during the last 50 years and the expansion of chemical research to the status of "big business." He reminded the members that the functions of the Rubber Division were to act as a medium for the exchange of technical information on rubber and to afford a means for social contacts. The success of Division meetings depends not only on the quality of the papers presented, but also on the amount of discussion following their presentation, Dr. Cramer declared. The amount of discussion of papers at Division meetings, possibly because of the very large number of persons that attend these meetings, has declined considerably, and every effort should be made to encourage a greater amount of comment and discussion, it was said.

Abstracts of all the papers given at this meeting were published in our April issue. As expected, much interest was evinced in the fact that GR-S latex after polymerization at lower than standard temperature will deposit films with gum tensile strengths in the neighborhood of 4,000 p.s.i. Also, the three papers on "cold rubber" in tires provided the most up-to-date evaluation of this situation and helped to remove some of the confusion that has arisen in connection with the numerous statements that have been made on how much improvement may be attributed to the use of "cold rubber" in passenger-car tires.

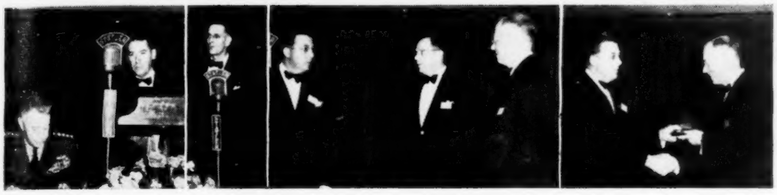
Further information on the reasons why furnace-type carbon blacks give better results than channel-type blacks in "cold rubber" and how the removal of chemisorbed oxygen from channel blacks improves their curing properties in "cold rubber" and eliminates to a large degree the differences in reinforcement between HAF black and channel black of comparable particle size was presented. Bound rubber and carbon gel formation in "cold rubber" compounds were also shown in another paper to be important factors in the compounding of this new synthetic rubber.

An overall evaluation of the present reclaimed rubbers, the first data to be presented in this country on work on the Roelig-type testing machine, practical aspects of factory scorch control, and a discussion of the new Alfin process for synthetic rubber polymerization were some of the subjects covered in other papers on the program.

The Business Meeting

At the opening of the business meeting on Wednesday morning, Dr. Cramer ex-

Head Table at the Rubber Division Banquet (*Left to Right*): H. A. Atwater, J. L. Haas, Local Committeemen; J. R. Moore, Director; O. J. Brown, Jr., Local Committeeman; F. L. Holbrook and W. B. Dunlap, Jr., Division Directors; H. W. Sutton, Local Committeeman; E. H. Krismann, Director and Local Committeeman; J. G. Augenstein, Director; C. C. Davis, Editor, *Rubber Chemistry and Technology;* G. L. Swart, Director; C. W. Christensen, Division Treasurer; F. W. Stavely, Chairman-Elect; J. C. Walton, General Chairman of Local Committee; Gen. George C. Kenney; (*Standing*): S. C. Stokes, British Rubber Producers Research Association



Ceremonies at Head Table (*Left to Right*): Mr. Walton Introducing General Kenney; Dr. Blake Speaking on "The Medalist and His Career"; Dr. Fisher Being Presented to Dr. Cramer by Mr. Outcault; Dr. Cramer Conferring the Goodyear Medal on Dr. Fisher

pressed his sorrow at having to inform the Division of the recent deaths of Dr. Boss and Mr. Easley. Webster Jones, Carnegie Institute of Technology and former associate of Dr. Boss at The B. F. Goodrich Co., spoke of his active participation in the affairs of the Division, his help to young compounders in the industry, his work on Calcene and Silene pigments, and his long period of service with the Office of Rubber Reserve.

Division members stood for a moment of silent tribute to their former associates, and the secretary was instructed to write letters of condolence to the widows and families of the deceased.

In connection with the proposed international rubber conference to be held at the time of the 1950 fall meeting of the Division, Dr. Cramer said that such a conference had been under consideration by the Division officers for the last year and a half. If conditions are favorable and the necessary details can be arranged, the conference will be held.

It was requested that papers on the subject of manufacturing and processing problems were especially desired for the 1949 fall meeting in Atlantic City.

John Blake, Simplex Wire & Cable, chairman of the nominating committee, announced the following slate for officers and directors of the Division for the coming year: chairman, F. W. Stavely, Firestone Tire & Rubber Co.; vice chairman, S. G. Byam, E. I. du Pont de Nemours & Co., Inc., and J. H. Fielding, Goodyear; secretary, C. R. Haynes, Binney & Smith Co.; and treasurer, C. W. Christensen, Monsanto Chemical Co.

Nominations for directors from the areas of the sponsored local rubber groups were: *Rhode Island*, F. H. Springer, Davol Rubber Co., and A. D. Cummings, Collyer Insulated Wire Co.; *Northern California*, A. E. Barrett, Mare Island Naval Shipyard, and H. J. Jordan, du Pont; *Boston*, H. Atwater, Hood Rubber, and F. H. Amon, Cabot; *Detroit*, G. M. Wolf, Sharples Chemicals, and Gordon Lindner, Minnesota Mining & Mfg. Co.; *New York*, D. E. Jones, American Hard Rubber Co., and P. Muraski, du Pont; *Akron*, A. E. Juve, Goodrich, and H. Palmer, consultant; *Chicago*, R. C. Dale, Inland Rubber Corp., and B. W. Hubbard, Ideal Roller & Mfg. Co.; *Southern Ohio*, Jack Feldman, Inland, and Bernard Adinoff, Dayton Rubber Co.; *Philadelphia*, L. K. Youse, L. H. Gilmer Co., and F. M. Galloway, Quaker Rubber Corp.; *Los Angeles*, R. D. Abbott, consultant, and R. E. Hutchinson, Firestone; *Connecticut*, C. M. Doede, Connecticut Hard Rubber Co., and W. J. O'Brien, Jr., Seamless Rubber Co.; and *Buffalo*, A. H. Davis, Dunlop Tire & Rubber Co., and D. S. Messenger, Garlock Packing Co.

Harry Outcault, chairman of the Charles Goodyear Medal Award committee, announced that this committee will consider nominations from the members for the next medalist at the coming Atlantic City meeting. In writing to him on these nominations members are asked to include the reasons for the nomination. Mr. Outcault also added that it was not necessary to nominate a medalist each year, but the committee wished to consider all nominations that any member might wish to make.

The Division Banquet

At the Divisional banquet at the Hotel Statler the evening of May 24, Chairman Cramer presided at the head table, at which were seated Dr. Fisher and the Division's honored guest and speaker, General Kenney, officers and directors of the Division, members of the local committee for the meeting, and another honored guest of the Division, S. C. Stokes, British Rubber Producers Research Association.

Dr. Cramer first made reference to the last time the Rubber Division met in Boston in 1939 at the 100-year anniversary of the discovery of vulcanization, when Mr. Bierer had been chairman. Dr. Cramer then introduced those at the head table to the audience and expressed the appreciation of the officers and the directors of the Division to members of the local committee, headed by James C. Walton, Boston Woven Hose, for their work in handling the details of the meeting.

At the beginning the ceremonies in connection with the award of the Charles Goodyear Medal to Dr. Fisher, expressions of regret because of inability to be present from Linus Pauling and Roger Adams, president and chairman of the board, respectively, of the A. C. S., were mentioned by Dr. Cramer, as was a telegram of congratulations to Dr. Fisher by N. A. Shepard, American Cyanamid Co.

Dr. Blake next spoke on "The Medalist and His Career." In receiving the sixth Goodyear Medal, the recipient, Dr. Fisher, can properly take a well-earned place beside his predecessors, Drs. Spence, Sebrell, Semon, Williams, and Oenslager, this speaker said. The qualities of persistence and endurance in following a path to a goal, so characteristic of Charles Goodyear, have been adequately demonstrated by the medalist, Dr. Blake added. Special mention was made of Dr. Fisher's research on the reactions of sulfuric acid and related materials on rubber and on nonsulfur vulcanization.

Mr. Outcault then presented Dr. Fisher to Dr. Cramer, who conferred the medal and certificate of the award on Dr. Fisher.

In his acceptance address, the Medalist reviewed progress in rubber research from Charles Goodyear up to the present time and compared the work of the Nineteenth Century with that which has been done in the last 35 years.

The first decade of the present century marked a definite turning point in rubber research, it was said. Increase in research was becoming general, and it was no wonder that this increase should include rubber because it is a natural substance; interest in such substances was high; and, furthermore, it was becoming of considerable commercial importance.

The development of rubber plantations in the Far East, the technical development of the pneumatic tire, the use of rubber scrap through reclaiming, and then the added incentive for more and greater use of rubber that came with the advent of the automobile, all these widened the rubber horizon and speeded up both scientific as well as practical work on rubber.

The earliest reported American research on rubber was an article "On the Action of Chromyl Chloride on India Rubber" by David Spence—first Goodyear medalist—and J. C. Galletyl, followed by articles on synthetic rubber by F. J. Pond in 1914, and L. P. Kyriakides and R. B. Earle in the same year. The record up to 1915, therefore, shows only three American research papers.

Worldwide research on rubber from 1907 to 1947 was analyzed from the indices of *Chemical Abstracts*, and it was shown that for the last three decades the total number of papers written approximated 10,000 for each of the 10-year periods. During the last 10 years listed papers totaled about 1,000 a year, with a steady decrease in the rubber and an increase in the synthetic rubber classification.

Mention was made of the first rubber industry laboratories established at Boston Woven Hose and at Goodrich, and how these and future laboratories became established as an essential part of the rubber manufacturing industry.

Over the years and up to World War II most of the research work in Europe was done by university men; whereas in this country most of it was done by industrial men. Industry needs the services of good research men and gains much from them. Industry, however, by its very nature finds it difficult to give a research man full rein, and the research man does not always find the industrial environment conducive to his best efforts in an attempted program of fundamental research, even though he has the full consent of the management for his method of attacking the problem. This condition exists because he is part of an

H. I. Cramer, Division Chairman; H. L. Fisher, Goodyear Medalist; H. E. Outcault, Chairman, Goodyear Medal Committee, and Director; J. T. Blake, Director; W. J. Murphy, Editor, *Industrial and Engineering Chemistry;* C. R. Haynes, Secretary; J. M. Bierer, Chairman Boston 25-Year Club Luncheon Meeting; D. C. Scott, Sr., Director; B. H. Capen, Local Committeeman; S. L. Brams, Director; T. M. Knowland, Local Committeeman; C. E. Frick, Director; G. W. Smith, Local Committeeman; D. C. Maddy, Director; R. K. Patrick, Local Committeeman; and J. W. Temple, Director

organization that must produce practical results.

Industry is built on ideas, and it needs the results of fundamental research—they are its life blood, Dr. Fisher stated. The time has gone by when a chemist can put his hand into the magic investigational hat and quickly bring out a new discovery or invention. We need more information, definite scientific information, in order to produce industrial miracles.

It was for these reasons that Dr. Fisher added his voice to those who have been urging an American Rubber Research Institute for almost 30 years. An institute of this type could probably best be sponsored and controlled by American manufacturers, he added. Since the entire public would benefit from the results, the government should contribute toward its support just as it does in accordance with the present trend in other similar instances. The administration and the responsibility for all fundamental research on rubbers would then be in the hands of private industry with the government in a supporting rather than an initiating role.

In conclusion, Dr. Fisher emphasized that only research of a fundamental nature should be considered in the institute's program and ended his address with the quotation: "Research is the price of progress."

Chicago Group Outing Plans

THE Chicago Rubber Group will hold its annual golf outing July 9 at St. Andrews Golf Club, Wheaton, Ill. Besides the usual golf features the committee plans several novelty surprises. Golf will start at 9:00 a.m., and dinner at 6:30 p.m., after which door and golf prizes will be distributed. The outing committee includes: A. E. Laurence, chairman, Phillips Chemical Division; John Groot and Harold Stark, Dryden Rubber Division; Wm. Fairclough, Enjay, Inc.; Maurice J. O'Connor, C. P. Hall Co.; Charles E. Wonder, Van Cleef Brothers.

Capital Group Hears Polhamus

APPROXIMATELY 75 members and guests of the Washington Rubber Group attended a regular meeting on May 24 at the Cosmos Club, Washington, D. C. Featured speaker was Loren G. Polhamus, Division of Rubber Plant Investigations, United States Department of Agriculture, who discussed "Natural Rubber Developments in the Western Hemisphere."

Mr. Polhamus noted that following World War I, the Commerce Department made extensive surveys of sources of crude rubber. Rubber plantings were initiated by Ford Motor Co. in Brazil; Firestone Tire & Rubber Co. in Liberia; Goodyear Tire & Rubber Co. in Panama and Costa Rica; The B. F. Goodrich Co. in the Dominican Republic; and United Fruit Co. in Panama, Costa Rica, and Honduras. All plantings in Central and South America were affected by leaf disease.

In 1940 the Department of Agriculture initiated plantings in tropical America in cooperation with the local governments. Research work was started, and high-yielding clones were obtained from the Philippines. Following up work done in Brazil, disease-resistant clones were developed for top-budding *Hevea*. A workable process was developed so that rubber plantings in the Western Hemisphere will no longer be subject to leaf disease. Active extension work is going on in 11 tropical American countries to develop rubber production primarily by small growers. The speaker also noted that a research program is also being conducted in the United States primarily with guayule, but including *kok-saghyz* and other promising plants.

Election of officers took place in the business session, with the following results: president, R. J. Devereaux, Goodrich; vice president, T. A. Werkenthin, Navy Department; secretary, Norman Bekkedahl, Bureau of Standards; treasurer, E. A. Bukzin, Navy Department; and recording secretary, Miss Ethel Levene, Navy Department. A report was heard from the program committee, and tentative plans were made for an outing during the summer and a dinner-meeting in October.

Houwink Guest Speaker

R. Houwink, director of the Rubber Foundation, Delft, Holland, was guest speaker at the April 26 dinner-meeting of the Washington Rubber Group. About 100 members and guests attended the meeting, held at the Cosmos Club.

Dr. Houwink spoke on "Rubber in Road Construction," describing the use of rubber powder in road surfacing and filler joints. The speaker gave detailed information on the compositions used and showed bution to other interested companies for Java, where superior results have been attained with rubber road surfacing.

Additional Experimental GR-S Polymers and Latices

ADDITIONS to the list of experimental GR-S dry polymers and GR-S latices, available for distribution to rubber goods manufacturers under the conditions outlined in our November, 1945 issue, page 237, appear in the table printed below.

Normally, experimental polymers will be produced only at the request of the consumers, and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside, if possible, for distribution to other interested companies for their evaluation. The 20 bales, when available, will be distributed in quantities of one bale or two bales upon request to the Sales Division of Rubber Reserve, or will be held for six months after the experimental polymer was produced, unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received.

These new polymers are experimental only, and the Office of Rubber Reserve does not make any representations or warranties of any kind, expressed or implied, as to the specifications or properties of such experimental polymers, or the results to be obtained from their use.

X-Number Designation	Manufacturing Plant	Date of Authorization	Polymer Description
X-494-GR-S	General, Baytown	10-12-48	A mixture of 75±3 parts of HMF black and 100 parts of GR-S type of polymer having a Mooney equivalent of 40±4 on the finished unpigmented polymer. Stabilized with 1.5 parts Stalite.
X-495-GR-S	Cancelled		
X-496-GR-S-SP	U. S. Rubber, Naugatuck	10-14-48	Similar to GR-S-117 except strained before and after drying. Mooney viscosity 70±5. Glue-acid coagulation.
X-497-GR-S	Copolymer, Baton Rouge,	10-14-48	Similar to GR-S-10 except shortstopped with dinitrochlorobenzene.
X-498-GR-S	U. S. Rubber, Borger	10-15-48	A mixture of 55 parts Philblack 0 and 100 parts of X-481-GR-S type of polymer. Viscosity of the contained polymer, 50 Mooney. Stabilized with 1.5 parts BLE on the rubber.
X-499-GR-S	Firestone, Lake Charles	11-2-48	X-499 GR-S-X-485 GR-S latex coagulated with salt-acid in the Lake Charles equipment. Antioxidant, 1.25% PBNA.
X-500-GR-S	Firestone, Lake Charles	11-2-48	X-500 GR-S - X-485 GR-S latex coagulated with alum. Antioxidant, 1.25% PBNA.
X-501-GR-S	U. S. Rubber, Borger	11-17-48	Same as GR-S-10 except shortstopped with sodium sulfide and stabilized with 1.5 parts EFED.
X-502-GR-S	Goodyear, Torrance	11-30-48	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with rosin soap, 55 Mooney, shortstopped with dinitrochlorobenzene. Antioxidant, 1.25% BLE.
X-503-GR-S	Goodyear, Torrance	11-22-48	GR-S made at reduced reaction temperatures with cumene hydroperoxide activated recipe, low sugar, emulsified with potassium soap of a fatty acid, 55 Mooney, shortstopped with dinitrochlorobenzene. Antioxidant, 1.25% BLE.
X-504-GR-S	Goodyear, Torrance	11-22-48	Same as regular GR-S except shortstopped with dinitrochlorobenzene.
X-505-GR-S	Goodyear, Torrance	11-22-48	Standard GR-S concurrently produced with X-504 GR-S for control purposes.
X-506-GR-S	Firestone, Lake Charles	11-22-48	GR-S stabilized with PBNA to be used as the standard reference test sample beginning January 1, 1949.
X-507-GR-S	U. S. Rubber, Borger	12-10-48	A mixture of 55 parts Philblack 0 and 100 parts GR-S made at reduced reaction temperature and with cumene hydroperoxide activated recipe emusified with Dresinate 731. Approximately 3% Marasperse on the black used in slurry makeup. Shortstopped with ditertiarybutyl hydroquinone. Mooney viscosity of polymer in latex, approximately 50. Antioxidant, 1.5% BLE.
X-508-GR-S	U. S. Rubber, Borger	12-17-48	A mixture of 60 parts Philblack 0 and 100 parts of continuous process GR-S-10. Mooney of polymer in latex, approximately 54. Antioxidant, 1.5% BLE on the polymer.
X-509-GR-S	Goodyear, Torrance	12-27-48	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate 214. Shortstopped with dinitrochlorobenzene. Mooney, 55±5. Antioxidant, 1.25% BLE.
X-510-GR-S	U. S. Rubber, Borger	12-22-48	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate 214. Shortstopped with ditertiarybutyl hydroquinone. Mooney, approximately 55. Antioxidant, 1.25% BLE.
X-511-GR-S	U. S. Rubber, Borger	1-17-49	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with potassium oleate. Shortstopped with ditertiarybutyl hydroquinone. Mooney, 55±5. Antioxidant, 1.25% BLE. Dilute latex—dilute alum coagulation.

RUBBER WORLD NEWS of the MONTH

Further Comments on Study Group Meeting Made; 1947 Census of Manufactures Figures

Further comments on the results of the March Rubber Study Group meeting added confirmation to the fact expressed last month that the challenge to natural rubber, as an irreplaceable commodity, by American synthetic rubber has now been accepted by the majority of natural rubber producers. According to Harvey S. Firestone, Jr., in a statement made following his return from the meeting: "World-wide recognition of American synthetic rubber production as a powerful, permanent factor in the international rubber market can be regarded as the most important direct result of the recent meeting of the International Rubber Study Group in London."

The use of either natural or synthetic rubber in road construction is reported as the biggest new use which has hit the industry since the advent of latex foam and has even greater consumption potential. Preliminary figures from the 1947 Census of Manufactures show tire and tube shipments for that year valued at more than $1.5 billion, mechanical goods, coated fabrics, and general sundries shipments valued at almost one billion dollars, and rubber footwear shipments valued at about $200 million. The Ohio Legislature indefinitely postponed consideration of bills that would make possible the 130-mile belt railroad across the State of Ohio. Negotiations between The B. F. Goodrich Co. and the URWA union on a fourth round of wage increases and a new contract were scheduled to begin in Chicago on May 23. Negotiations between the union and the other Big Four members on the wage increase question are also scheduled to begin in June and July.

Further Comments on Study Group Meeting

The results of the Rubber Study Group meeting in London, England, during the week of March 28, were discussed at some length in our May issue. Certain additional comments, however, have since been received and will be recorded herewith.

Harvey S. Firestone, Jr., chairman of the board, Firestone Tire & Rubber Co., in a statement made upon his return to the United States in late April said, "World-wide recognition of American synthetic rubber production as a powerful, permanent factor in the international rubber market can be regarded as the most important direct result of the recent meeting of the International Rubber Study Group in London.

"With this recognition came acceptance of the fact that natural rubber no longer enjoys the position of an irreplaceable commodity which can be controlled by national monopoly or international cartel.

"Representatives of the natural rubber industry were deeply impressed when the United States disclosed the extent to which synthetic rubber has been adopted by rubber consuming industries. The American delegation took the position that some mandatory use of synthetic rubber in American-made passenger and light truck tires was required from the standpoint of national security, but actually a modification of this policy might have no appreciable effect upon the consumption of synthetic rubber, to the advantage of natural rubber. During 1948, for example, 170,000 tons of synthetic rubber was purchased by American manufacturers on a strictly voluntary basis.

"Experiments to improve the quality of GR-S by a low temperature process in which the ingredients are polymerized at 41° F., have led to the development of the new 'cold rubber' which has been successfully tested. This new GR-S is approximately 5% better than natural rubber for tread wear in passenger car tires. The properties of newly developed furnace blacks complement those of 'cold rubber' and make possible further improvements in tread wear ranging from 20 to 30%.

"As supplies become more plentiful, it is expected that 'cold rubber' will replace standard GR-S wherever it is used in treads for small passenger-car tires. Since this polymer is outstanding for resistance to tread wear, manufacturers may use it on a voluntary basis in place of natural rubber to improve the performance of the larger passenger-car tire sizes.

"A similar trend also can be noted in the case of rubber latex. The consumption of synthetic latex has continued at a high level notwithstanding the reduction that has taken place in the price of natural rubber latex, and the removal in May, 1948, of all restrictions regarding its use. Since low temperature GR-S latices show improved properties over the regular GR-S types, they may, to some extent, further replace natural rubber latices. Generally speaking, the outlook for GR-S latex is one of increasing use," Mr. Firestone concluded.

An editorial in *The Straits Times* of Singapore on May 2, reprinted in Lockwood's *Rubber Report* for May 15 on "Problems of the Planter," include's the following significant statements.

"The Rubber Study Group conference held recently in London ended what faint hope remained of American willingness to restrict the use of synthetic or encourage the use of the natural product, and the latest figures of consumption do nothing to line the cloud with silver. Consumption of new rubber in the United States in the first quarter of the year was 7% less than for the corresponding period of last year. The proportion of synthetic rubber in this has risen. The March rate was 45%, an increase of 2% compared with the end of the year, the reward, no doubt, for the price of natural being depressed below that of synthetic. Synthetic has ceased to hold a price advantage for so long now that it is plain that natural rubber's failure to reduce the quantity of synthetic that is used has little to do with price. It is fairly obvious that the real factor is quality, or the absence of it.

"By quality more is meant than reasonable cleanliness and respectable packing, though in both these respects the post-war quality of Malayan rubber does not begin to bear comparison with prewar. To American manufacturers the most attractive feature of synthetic rubber is that it is sold on specifications which enable them to buy the type best suited for their requirements, with the knowledge that what they buy will be up to specification. This is a service which the producers of natural rubber have not really begun to offer, and until they are able to match synthetic in this respect they will continue to fall still further behind. The threat of synthetic rubber to the economy of this country even now is not properly appreciated. It is so serious that it must be met with something much more compelling than piece-meal device and the individual enterprise of the larger and better capitalized concerns, backed by pleas to the sentimental American not to ruin the planters and peasants of South East Asia. It is a threat that will have to be met and repelled by methods more nearly approaching a national effort, supported by every government resource, and making the fullest use of every scientific aid. This is beginning to be seen, but proper appreciation is slow in coming, and it is pity that Sir Sydney Palmer, who is in an unrivalled position to influence events in the rubber growing industry, did not use this occasion more designedly to that end."

(Sir Sydney Palmer is president of the United Planting Association of Malaya —EDITOR.)

Rubber in Roads

R. P. Dinsmore, vice president in charge of research and development for the Goodyear Tire & Rubber Co., in a talk before a joint meeting of the Ontario Rubber Section and the Buffalo Rubber Group on May 6, devoted part of his talk to the possibility of increased rubber use in rubber-asphalt road coatings. More complete details of his talk are found elsewhere in this issue.

The Rubber Foundation in Delft, Netherlands, prior to the war did some pioneering work in the use of rubber-asphalt road coatings, and Dr. Houwink, director of the foundation, was in the United States until May in connection with trial road sections being built in Virginia, Texas, and Ohio.

Lockwood's May 15 *Rubber Report* has the following interesting comment on this project.

"The nice part of this project is that here we have a use unhampered by mandatory consumption restrictions where natural and synthetic rubber can compete with each other in the American way on the basis of quality and price. Dr. Dinsmore prefers GR-S, and the Dutch tests show a clear superiority for natural. The American highway officials can be relied upon to use whatever does the best job at the best price. We are confident after exhaustive study and personal contacts in several States that the future for rubber in this new use far exceeds expectations, and we feel certain that actual consumption of rubber in road consumption in 1951 will be statistically important. The volume of evidence coming into this office on that score is overwhelming. We are submerged in a flood of inquiries from States, municipalities, petroleum company executives, Federal Government officials, and others, and we flatly claim that this development is the biggest new use which has hit the industry since the advent of latex foam and has an even greater consumption potential."

Preliminary 1947 Manufacturers' Census Figures

Some preliminary figures from the 1947 Census of Manufactures recently became

available from the Bureau of Census, United States Department of Commerce. Final and more detailed figures will appear in the Census publication, "Tires and Inner Tubes, Rubber Footwear and Miscellaneous Rubber Products," which will be published and offered for sale by the Superintendent of Documents in the near future.

Manufacturers of tires and inner tubes shipped products valued at $1,547,000,000 during 1947. This figures represents an increase of 166% over the $580,900,000 value of products reported by this industry in 1939, when the last Census of Manufactures was taken. General statistics for the tire and tube industry are given below.

TIRE AND TUBE INDUSTRY STATISTICS—1947 AND 1939

(Money Figures and Man-Hours in Millions)

Item	1947	1939
Number of establishments	57	53
All employes:		
Number (average for the year)	115,657	67,169
Salaries and wages (total)	$390.8	$122.2
Production and related workers:		
Number (average for the year)	93,916	54,115
Man-hours (total)	185.4	n.a.
Wages (total)	$311.3	$89.8
Value added by manufacture*	$650.2	$231.4
Cost of materials, fuel, electricity, and contract work	$944.2	$349.5
Value of shipments†	$1,547.0	$580.9
Expenditures for new plant and equipment	$54.9	$17.0

n.a. Not available.
*For 1947, partly estimated by subtraction cost of materials, fuel, electricity, and contract work from the value of production calculated by multiplying quantity produced by unit value of shipments. For 1939, value of production less cost of materials, fuel, electricity, and contract work.
†Value of production for 1939.

Manufacturers in the rubber industries, not elsewhere classified, which comprise establishments engaged in the manufacture of industrial and mechanical rubber goods, rubberized fabrics and vulcanized rubber clothing, and miscellaneous rubber specialties and sundries, shipped products valued at $953,500,000 during 1947, as compared with $264,500,000 in 1939. This is an increase of 261% for the 1947 figure over the 1939 figure.

MECHANICAL GOODS, COATING AND GENERAL SUNDRIES INDUSTRY STATISTICS—1947 AND 1939

(Money Figures and Man-Hours in Millions)

Item	1947	1939
Number of establishments	777	519
All employes:		
Number (average for the year)	113,240	63,189
Salaries and wages (total)	$313.1	$80.7
Production and related workers:		
Number (average for the year)	94,810	50,692
Man-hours (total)	186.7	n.a.
Wages (total)	$239.2	$53.4
Value added by manufacture	$522.1	$141.6
Cost of materials, fuel, electricity, and contract work	$441.2	$122.9
Value of shipments	$953.5	$264.5
Expenditures for new plant and equipment	$47.1	$10.3

Manufacturers in the reclaimed rubber industry shipped products valued at $17,300,000 during 1947, as compared with products valued at $6,900,000 in 1939.

GENERAL STATISTICS FOR THE RECLAIMED RUBBER INDUSTRY—1947 AND 1939

(Money Figures and Man-Hours in Millions)

Item	1947	1939
Number of establishments	15	10
All employes:		
Number (average for the year)	2,070	1,282
Salaries and wages (total)	$6.8	$2.0
Production and related workers:		
Number (average for the year)	1,855	1,072
Man-hours (total)	4.0	n.a.
Wages (total)	$5.8	$1.5
Value added by manufacture	$9.6	$3.9
Cost of materials, fuel, electricity, and contract work	$8.0	$3.0
Value of shipments	$17.3	$6.9
Expenditures for new plant and equipment	$2.9	$0.4

Manufacturers in the rubber footwear industry shipped products valued at $198,700,000 during 1947, as compared with the $50,000,000 value of shipments in 1939, an increase for 1947 of almost 300%. In addition, statistics are given for the production in pairs and their value in 1947 and 1939 of canvas footwear, boots, lumberman and pacs, and rubbers, arctics and gaiters.

GENERAL STATISTICS FOR THE RUBBER FOOTWEAR INDUSTRY—1947 AND 1939

(Money Figures and Man-Hours in Millions)

Item	1947	1939
Number of establishments	26	13
All employes:		
Number (average for the year)	28,125	18,098
Salaries and wages (total)	$72.7	$22.1
Production and related workers:		
Number (average for the year)	23,952	14,861
Man-hours (total)	48.9	n.a.
Wages (total)	$58.5	$16.8
Value added by manufacture	$121.0	$29.2
Cost of materials, fuel, electricity, and contract work	$80.6	$20.8
Value of shipments	$198.7	$50.0
Expenditures for new plant and equipment	$5.0	$1.5

RUBBER FOOTWEAR: 1947 SHIPMENTS AND PRODUCTION BY TYPES AND 1939 PRODUCTION BY TYPES

(All Figures in Millions)

	1947 Total Shipments and Interplant Transfers		1947 Total Production	1939 Production	
Item	Pairs	Value	Pairs	Pairs	Value
Rubber footwear, aggregate value		*$157.5			$43.1
Canvas footwear	22.6	38.0	23.6	28.2	15.0
Boots	5.4	19.9	5.6	2.9	5.1
Lumberman and pacs	1.8	6.9	1.9	1.1	2.0
Rubber, arctics, and gaiters	48.1	92.7	48.7	†30.6	†21.0

*The sum of dollar values for these commodities differs from the total shown in the preceding table since the above figures exclude the value of products other than rubber footwear, amounting to $41,200,000 in 1947, of which approximately 70% are other rubber products not classified in this industry; the above 1947 figures also do not include value of all rubber footwear produced outside the industry.
†Includes an unspecified amount of other rubber shoes.

Belt Railroad Suffers Setback

The 130-mile belt railroad across the State of Ohio proposed a few months ago by H. B. Stewart, Jr., president of the Akron, Canton & Youngstown Railroad, suffered a setback when committees of both houses of the Ohio legislature voted to postpone indefinitely consideration of bills to grant Riverlake Belt Conveyor Lines, Inc., the right to acquire "eminent domain" for the project. The vote came after prolonged hearings at which railroads and their unions voiced bitter opposition to the project because it would mean less business for the railroads and fewer jobs for the union members.

Mr. Stewart, president of Riverlake Belt Conveyor Lines as well as of the A, C & Y R.R., stated that he is confident that the necessary legislation will be passed by the next legislature, which convenes in 1951. Meanwhile it has been decided to continue the engineering work on the belt line and thus avoid the delay that would result if this work were not undertaken until after the legislation had been passed two years from now. It had been estimated that the engineering study would require a year's time and actual construction three years.

Current Industry Production Trends

As mentioned last month, the tire and tube branch of the industry seems to think that despite a slow start, tire and tube sales in 1949 will be close to the 1948 figure. Of course cutbacks in tire production may result if the Ford Motor Co. strike is a prolonged one and if other major automobile manufacturers run into similar difficulties. It is estimated that Ford uses about 3½ to four million tires as original equipment each year, and the loss of any significant portion of this business would slow down tire production of the three major companies that serve this customer.

The regular monthly report of The Rubber Manufacturers Association, Inc., on tire and tube production, shipments, and inventory, stated that manufacturers shipments of passenger-car tires in March totaled 4,897,869 units, a jump of 24.4% from February, when shipments amounted to 3,936,490 units. Production during March was up to 5,361,336 units, 12% higher than the February production of 4,782,309 tires. Manufacturers' inventories on March 31 were 10,669,721 units, against 10,180,130 at the end of the previous month.

Shipments of truck and bus tires during March totaled 1,004,719 units, an increase of more than 8% over February, when 929,078 tires were shipped. Production was up 9.7% to 1,216,167 units, against 1,108,523 in February. Inventories amounted to 2,420,855 units at the end of March, as against 2,205,330 at the end of February.

Shipments of automotive tubes were about 17% higher during March at 5,173,772 tubes, against 4,406,172 for February. March production amounted to 5,947,598 tubes, against 4,921,766 in February, an increase of 20.8%. Stocks of inner tubes were up to 11,230,827 at the end of March, as compared with 10,442,118 the previous month.

A price cut of about 19% in passenger-car tires by the Standard Oil Company of Ohio announced on May 18 caused some concern. This first price cut in 18 months reduced the price, for example, of the 6.00 x 16 Atlas tire from $15.95 to $12.92. The only reaction from the manufacturing industry was a temporary reduction by the Goodrich company for a period of 10 days on its Silvertown tire line. Goodrich made a comparable reduction on the same-size tire to $12.95.

A spokesman for Seiberling Rubber Co. expressed the thinking of at least one segment of the industry when he said:

"We don't know how anybody can reduce prices and maintain quality in these times. Trying to save dollars on tires is the poorest kind of economy. For every dollar a manufacturer takes out in material, the customer loses a lot more than a dollar in value which means service or safety or both," he added.

In the mechanical goods field, business for the first quarter of the year was about 15% lower than last year in the manufacture of belting and hose, but the outlook for the remainder of the year is reported good. Molded goods, particularly for the automotive field, has had to be maintained at a high level of production to keep pace with the automobile manufacturer's needs. Molded goods production for other industrial uses, such as the appliance manufacturers, has been off in some cases as much as 25%. The production picture by individual companies is therefore variable, depending on the proportion of business done in the several fields.

The Firestone Rubber & Latex Products Co. opened a new $1,750,000 addition to its Fall River, Mass., plant about May 1. Increasing demand for foamed sponge rubber for mattresses, automobile seats, and furniture upholstery was given as the reason for this plant expansion.

First-quarter business in the footwear and coated fabrics branches of the industry were reported as generally good, but somewhat under that for the first quarter of 1948.

United States exports of rubber and rubber products in March were valued at $10,991,679, compared with $9,524,466 in February and $12,069,626 in March, 1948, the Department of Commerce reported on May 11.

With the exceptions of scrap rubber and the "all other" miscellaneous class, March shipments in all categories increased over February, according to an analysis of Bureau of Census figures by the Office of Domestic Commerce.

Exports of synthetic rubber showed the greatest gain, increasing from $291,714 in February to $787,827 in March. The latter figure was the highest since the $1,055,121 recorded in June, 1947. Although shipments of truck, bus, and passenger-car tires increased but slightly in March compared with February, shipments of farm tractor and implement tires showed a large increase—from $411,733 to $757,863.

Value of exports in the first quarter of 1949 was $31,799,576, down 13.8% from the $36,881,772 reported for that period in 1948. Dollarwise, the greatest declines were in mechanical rubber goods and in truck, bus, and passenger-car tires. Percentagewise, the declines in mechanical rubber goods, passenger-car tires, and footwear, and soles and heels were the steepest. Synthetic rubber, aided by the large March shipments, showed a 62% gain over the 1948 period, and most of the remaining categories showed moderate gains.

As a further indication of production trends, the RMA reported on May 23 that new rubber consumption in April totaled 84,707 long tons and was about 7.5% lower than the March tonnage of 91,594 tons.

Use of natural rubber during April declined 9.1% to 47,937 long tons compared with 52,755 tons in the previous month. Consumption of synthetic rubber in April amounted to 36,770 long tons, a decline of 5.3% from the 38,839 tons used in March. Although total rubber consumption in April, 1949, was at approximately the same level as in April, 1948, the natural rubber used was down 5.3%; while the synthetic rubber used was up 6.2% when compared with the same month a year ago.

Synthetic rubber consumption in April, 1949, by types follows: GR-S, 29,821 long tons; neoprene, 2,604; Butyl, 4,984; and nitrile types, 454 tons.

Labor Relations News

In the field of labor-management relations the No. 1 item for the next several weeks will be the wage increase and/or pension plan negotiations of the Big Four and other rubber companies with the URWA union. Officials of the Goodrich Company and the union were scheduled to meet May 23 to decide on a place to begin wage and contract negotiations. Negotiations between Firestone and the union are scheduled to start on June 10, between Goodyear and the union on June 20, and between United States Rubber Co. and the union on July 10.

In Akron, O., the Goodrich local union held a public meeting to explain its reasons for asking for a wage increase and pension plan at this time and to enlist public support for its drive. The local union president stated that Taft-Hartley Law or not, the rubber workers are determined to secure their just demands and are determined to fight harder than ever before to attain these aims.

Also in Akron, the first company-wide contract for production workers at the Seiberling company and the local URWA union was signed on May 8. This contract does not provide for a wage increase, but permits reopening of the wage question at a later date. The company granted maintenance of membership and check-off of union dues. The company has also agreed to permit union time-study men to check disputed work rates, and workers placed on jobs where rate standards have not been set will get 95% of past average hourly earnings instead of 90%. Reemployment rights for laid-off workers have been extended from five to ten years.

Strikes at the Dryden Rubber Division, Sheller Mfg. Corp., in Chicago, Ill., and at the Panther-Panco Rubber Co. in Chelsea, Mass., were reported during the latter part of May.

URWA President Ousted

In a surprise move the executive board of the United Rubber Workers of America, CIO, at a meeting in Philadelphia, Pa., in May, voted 7 to 5 to remove L. S. Buckmaster, international union president, on five charges of conduct against union members that constituted malfeasance in office. The board elevated Vice President H. R. Lloyd to the presidency and named F. M. Dickenson, vice president.

Opposition to Mr. Buckmaster has been growing in the union for the past two years and was aggravated recently by an incident at Pottstown, Pa., in March, when the international union president became involved in an argument with the local URWA president over who was to preside at a meeting in that city. A scuffle occurred, and Mr. Buckmaster was pushed off the stage at the meeting hall. Later he suspended the local union president from office, and the latter in turn filed charges with the general executive board asking that the international union president be removed from office.

The action has split the URWA into two factions, and it is reported that Mr. Buckmaster will seek reinstatement at the convention of the union, which is scheduled to be held in September in Toronto, Ont., Canada.

Bendix Home Appliances, Inc., South Bend, Ind., at a special press preview at the Waldorf-Astoria Hotel, New York, N. Y., introduced the new Economat, a fully automatic agitator-type washing machine using a revolutionary system of washing, draining, and drying. Hailed by J. S. Sayre, company president, as "the simplest and lowest-price automatic washing machine in the world," it is the result of two years work and an expenditure of $2,500,000. The new washer is top-loading, vibrationless, and requires no bolting to the floor. Secret of the Economat is the rubber Wondertub, made of Metexaloy by The General Tire & Rubber Co. This rubber compound, employing Columbia Chemical Division, Pittsburgh Plate Glass Co.'s Hi-Sil silicon reinforcer, provides unusual abrasion resistance and flexibility. The Wondertub washes wth improved action, using a plastic agitator, then squeezes in under vacuum pressure to force dirty water and suds down the hollow agitator. After two rinsings, vacuum pressure is again applied to the rubber tube to eliminate gently all excess water and leave clothes ready for hanging out to dry. The new washer goes on public display on June 6 and will be featured by the company in addition to its present line of gyratory washers.

EAST

Elections by Vulcanized Rubber

Vulcanized Rubber & Plastics Co., Inc., at its recent annual meeting of stockholders reelected all nine directors. Then the board met on May 10 and at the suggestion of President Stanley H. Renton,, made him chairman. He will devote his time chiefly to plans for the company's future progress and to problems of finance and stockholder and employe relations.

The board also elected the folowing officers: Prescott Beach, president, general manager, and operating head of the company; John J. Noble, first vice president; A. O. Redland, vice president, treasurer, and controller; Hilda Pfister, secretary. Other executives include Nicholas J. Jammal, works manager; C. P. Morgan, director of research and development; and H. L. Smith, Jr., general sales manager.

Mr. Beach, who has been with Vulcanized Rubber since 1933, has been a director and secretary of the company for nearly 10 years and general manager for the past year.

Vulcanized Rubber maintains a factory at Morrisville, Pa., and general offices at 261 Fifth Ave., New York 16, N. Y.

The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York, N. Y., recently made public the tire industry's annual recommendation for the safe and efficient maintenance of tires during the tire killing period of hot weather; a new record in summer travel is expected this year. The recommendation is linked to the National Safety Council's new slogan, "Check Your Car — Check Accidents." The RMA reminds all motorists that they can insure greater safety and longer tire life by: (1) careful attention to proper inflation: (2) avoiding curb and stone bruises, snags, and cuts; (3) regular checks on wheel alinements; (4) rotation of tires at regular intervals; and (5) reasonable driving within established speed limits.

Koppers Co., Inc., Pittsburgh 19, Pa., has opened the New England district sales office of its chemical division at 250 Stuart St., Boston, Mass., with J. W. LaBelle as manager. Creation of the new sales office came as the previous eastern district was divided into the New York and New England districts. The New England district will consist of all of New England in addition to a portion of New York State bounded by Kingston, Binghamton, and Syracuse.

J. P. Williams, Jr., chairman of the board, at Koppers, has retired from active management of the company, but will remain a director and chairman of the board and also serve as an adviser on special problems. Mr. Williams joined Koppers interests in 1920 as manager of the Melcroft Coal Co., was elected vice president of Koppers Coal Co. in 1927, when Melcroft was absorbed, was named president of the coal company in 1931; was elected executive vice president of Koppers in 1933, and president in 1939; and occupied the dual position of chairman of the board and president from October, 1944, until April 29, 1946, when General Brehon Somervell, now chief executive officer, was elected president.

Copolymer Open House

An open-house program commemorating the conversion of the entire plant facilities to the production of "cold rubber" was held at Copolymer Corp., Baton Rouge, La., on May 24. The all-day program was attended by approximately 250 persons, including government officials, members of the press from various parts of the country, and officials of Phillips Petroleum Co. and the eight companies operating Copolymer: Armstrong Rubber Co.; Dayton Rubber Co.; Gates Rubber Co.; Inland Rubber Corp.; Lake Shore Tire & Rubber Co.; Lee Rubber & Tire Corp.; Mansfield Tire & Rubber Co.; and Sears, Roebuck & Co.

The morning session, held at the plant, comprised a welcome by C. M. Hulings, Copolymer operating vice president; a talk on "Orientation," by E. C. Read briefly describing the manufacturing process for "cold rubber"; and a tire construction demonstration by Martin Samuels. Following a luncheon at the Baton Rouge Country Club, addresses were given on "Processing 'Cold Rubber' into Tires and Benefits to Motoring Public," by A. L. Freedlander, president of Copolymer and Dayton Rubber; "Development of 'Cold Rubber'," by W. B. Reynolds, Phillips Petroleum; and "Production of 'Cold Rubber'," by Mr. Hulings.

Describing "cold rubber" as "one of modern technology's most significant contributions to the welfare, economy, and security of every American," Mr. Freedlander noted that "cold rubber" sets up a keen competitive situation tending toward lower natural rubber prices. Mr. Freedlander also praised Rubber Reserve and RFC for their efforts and encouragement in the continual search for better rubber.

Dr. Reynolds stated that one of the factors responsible for the final rapid development of "cold rubber" was the development of a new process introduced at the University of Cincinnati and modified at the University of Minnesota to give unusually rapid results at low temperatures. The process was further studied and modified by Phillips Petroleum chemists to make it suitable for large-scale production, and the recipe now in greatest commercial use is Phillips' "Custom" recipe, a marked improvement over the early redox recipes. By a happy combination of circumstances, Phillips simultaneously developed a new furnace black of superior abrasion resistance which produced "cold rubber" tread compounds of unusual quality. Dr. Reynolds hailed the conversion of the Copolymer plant to "cold rubber" production as another important step in making this country self-sufficient insofar as its vital rubber needs are concerned.

Mr. Hulings described the many trials and difficulties encountered during the early days of "cold rubber" production at Copolymer. One of these difficulties, the tendency of the rubber to precoagulate in the reactors, pumps, and lines, was finally traced to contamination by small mosquito-like insects similar to the fruit fly. The speaker paid tribute to Phillips for its outstanding research and development work in the "cold rubber" program. The initial decision to produce "cold rubber" at Copolymer was reached on March 7, 1947, based on a paper presented by Phillips at a Rubber Reserve meeting on February 10, and the first "cold rubber" was made May 24. Test tires were built, and the data obtained resulted in Copolymer requesting permission to convert half of the plant to "cold rubber" production. These test data were equally available to all rubber companies, Mr. Huling pointed out, but the widely separated group of eight companies composing Copolymer reached a decision on "cold rubber" a year earlier than some of the others. The Copolymer request to convert to "cold rubber" was approved on October 1, 1947, and the necessary equipment was designed and installed ready to operate on February 20, 1948.

"Today our plant has the most modern equipment, and, in principle, it has been copied by all the other 'cold rubber' installations which are now being made elsewhere," Mr. Huling said.

The program concluded with a cocktail hour and dinner at the Roosevelt Hotel, New Orleans. After-dinner speaker was Charles F. Kettering, General Motors Corp., who discussed the importance of rubber to the automotive industry and prospects for improvement resulting from "cold rubber."

Sid Richardson Carbon Co., Fort Worth, Tex., has appointed Harwick Standard Chemical Co., of Akron, O., as its New England representative for the sale of Texas E and Texas M channel blacks. This association brings to the New England market direct sales representation with warehouse stocks of Texas E and Texas M maintained in the Boston area for better service both on supply and technical assistance.

C. A. Meyer

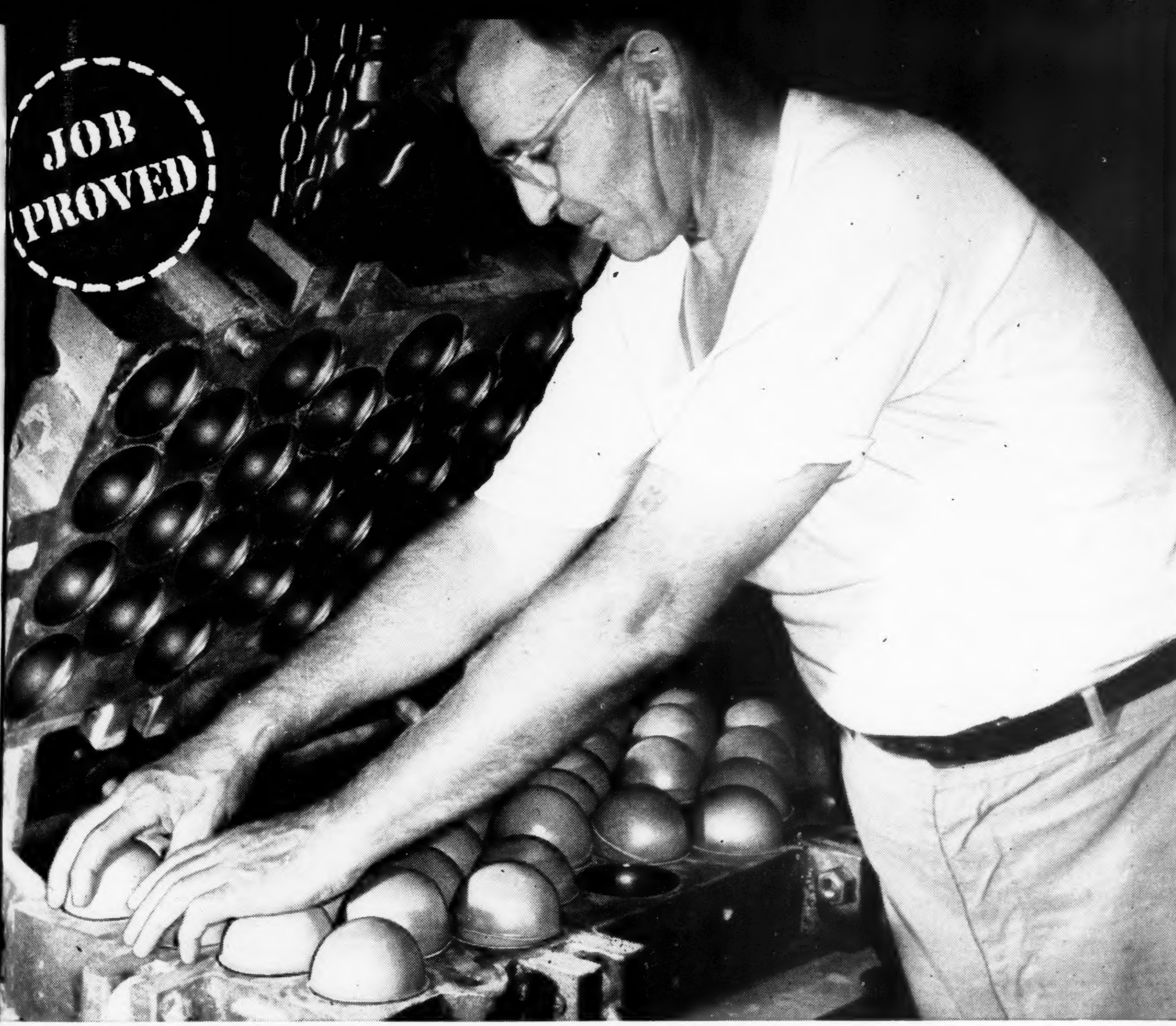
C. A. Meyer is in charge of the Harwick Standard Boston office, which he established in 1945, and will continue to operate from its present location, 404 Chamber of Commerce Bldg., Boston 10, Mass. Mr. Meyer is well known in New England, having been directly connected with several of the rubber manufacturers and the rubber industry for 25 years, and he also is a member of the American Chemical Society and is connected with the several rubber groups in the New England area.

Crown Cork & Seal Co., Baltimore, Md., at a recent directors' meeting made the following promotions, according to John J. Nagle, chairman of the board and president. Charles H. Griesacker was elected a vice president and relected assistant secretary. Walter L. McManus was elected a vice president and reelected as secretary. Cover B. Newman was elected treasurer and reelected assistant secretary. Lowell H. Smith was elected assistant vice president and reelected assistant secretary, and Elmer F. Fousek was elected an assistant secretary and assistant treasurer.

American Hard Rubber Co., 11 Mercer St., New York 13, N. Y., has appointed Budd E. Pollak secretary to succeed Robert Harry, retired. Mr. Pollak has been with the company since 1946 as assistant to the vice president and controller. He was formerly in the service of the U. S. Navy and prior to that had been associated with the War Production Board, Union Securities Corp., and J. & W. Seligman & Co.

Douglas Williamson recently was appointed sales promotion manager of American Hard Rubber. His duties consist of advertising and sales promotion work on Ace hard rubber combs, photographic equipment, and bowling balls, and battery parts and containers as well as the company's corrosion resistant equipment for the chemical processing industry and custom molding of specialties and components. Previously Mr. Williamson had been assistant to the advertising manager of Hyatt Bearings Division, General Motors Corp.

Copolymer Corp. Plant at Baton Rouge, La., Now Entirely Converted to "Cold Rubber" Production



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Sun Rubber-Processing Aid Improves Appearance of Rubber Toys, Cuts Manufacturing Costs

A manufacturer of rubber balls, miniature trucks, and other rubber toys was losing money because processing oils were bleeding out of the finished toys and spoiling the paint coating.

Switching to one of Sun's "Job Proved" Rubber-Processing Aids, he was able to stop all bleeding and at the same time make his lacquer finishes brighter and more enduring. Production men figured that costs were reduced by $1,500 a month.

In plant after plant where Sun Processing Aids are used, results like this are on record.

Sun Processing Aids are refined to insure chemical compatibility. For full information concerning them, or for your free copy of the Technical Bulletin "Processing Natural Rubber and Synthetic Polymers," write Dept. RW-6.

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Sun offers five "Job Proved" rubber-processing aids

1. **Circo Light Process Aid,** a general-purpose softener for neoprene and natural rubber.
2. **Circosol-2XH,** an elasticator for GR-S, a plasticizer for natural rubber.
3. **Circomar-5AA,** a free-flowing softener of the asphalt-flux type that is easy to handle at room temperature. Widely used for natural rubber and GR-S.
4. **Sunaptic Acid-130,** a mixture of high molecular weight naphthenic acids and hydrocarbon oil. It functions in the same manner as stearic acid in the activation of curing agents for rubber. It is "non-blooming."
5. **Sundex-54,** a low-cost processing aid, highly compatible with natural and GR-S.

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Goodrich Expanding Operations

The B. F. Goodrich Co., Akron, O., has begun volume production of the tubeless tire in its Tuscaloosa, Ala., and Miami, Okla., plants, according to Vice President James J. Newman. Production previously had been limited to the main plant in Akron, but the accumulation of orders from the Jacksonville, Fla., Cincinnati, O., and Indianapolis, Ind., districts, where the tubeless tire has been on sale, has necessitated increased production. Mr. Newman stated that the new tire was introduced in the Minneapolis-St. Paul, Minn., area in April as another step in the company's program to reach nationwide distribution by the end of 1949. Plans are under way for the production of tubeless tires at other Goodrich plants, with Oaks, Pa., probably next in line.

Substantial additions to the Goodrich tire plants in Miami, and Tuscaloosa, will be started immediately, the company announces. New warehouses for finished goods with 200,000 square feet of floor space in Oklahoma and 85,000 square feet in Alabama will be completed before the year-end. The addition in Miami is the third made by the company since 1945, and will be the second expansion in Tuscaloosa since 1947 when that plant began operations.

"Cold rubber," now used in a limited number of passenger-car tire treads, is being tested by rubber footwear by Hood Rubber Co., a division of Goodrich, President C. L. Muench has announced. Tests indicate "cold rubber" may show the same wear and abrasion resistant properties in footwear as the rubber does in tires. Installation of special refrigerating equipment is under way at Goodrich's Port Neches, Tex., rubber plant, and large-scale production of "cold rubber" is expected by the end of this year.

Personnel Promoted

Haskell A. Cunningham and Roy M. Corey have been assigned as field representatives of the petroleum company tire sales department. Mr. Cunningham will have headquarters in Houston, Tex., and Mr. Corey in Philadelphia, Pa.

Goodrich has also announced the following changes in its associated lines sales division, which handles sales of Brunswick, Diamond, Hood, and Miller brands of tires and accessories.

W. B. Flora, with the division since 1936, except for a three-year Navy stretch, has been made field manager, budget sales.

G. W. Thompson, who joined the division in 1925, has been appointed field manager for the Dallas, Tex., sales district.

Joseph P. Loftus, budget supervisor in New England, becomes field manager for the district comprising New York State.

B. F. Gill has been transferred to Philadelphia, Pa., as district field manager from a similar post in Detroit, where he is succeeded by Ernest Hookway.

Also reported last month were transfers, as follows, in the Goodrich replacement tire sales division.

Charles L. Campbell, with the company since 1912 and since 1936 manager of the Philadelphia district, has been made sales development manager of the eastern division. He is succeeded at Philadelphia by L. O. Veith, who started with Goodrich in 1928 as a field tire engineer and for the last two years was manager of the Harrisburg, Pa., retail store.

Frank R. Campbell, manager of the Washington, D. C., district of the replacement division, has been appointed sales development manager for the southeastern sales division. The Washington post goes to Clare E. Sears, who joined the company in 1929 as a tire adjuster and for the past seven years served as general supervisor in the Philadelphia district.

Glenn E. Martin has been named advertising manager of the division, responsible for all national and retail advertising and sales promotion on Goodrich brand tires. Mr. Martin has been with the company since 1933, always in advertising.

William H. Campbell has been appointed manager of the Albany district, succeeding Frank G. Harrison, Jr., resigned. Mr. Campbell joined the organization in 1937 and except for two years in the service spent all his time in sales.

Lewis B. McRae has been named manager of the Cincinnati district to succeed Mark O. Ward, who died April 22. Mr. McRae came to the company in 1936, serving mostly on budgets and sales.

Howard E. Fritz, Goodrich vice president-research, has been named a member of the National Committee of the Football Hall of Fame. Dr. Fritz was an athlete in his undergraduate days at Ohio State University where he won letters in football, basketball, and baseball. Grantland Rice, author and sports authority, is chairman of the Committee.

News from Goodyear

All the fanfare of a Hollywood premiere was evident in Akron recently when a new vinyl material developed by The Goodyear Tire & Rubber Co. was given endorsement by the Crosby Research Foundation, headed by Bing Crosby. The vinyl film, which has the softness of velvet, is being fabricated into rainwear by the Boland Mfg. Co., Winona, Minn., and its initial showing was held in the M. O'Neil Co. department store in Akron. Present for the premiere were Bob and Larry Crosby, vice president and managing director, respectively, of the Foundation, and Jerry Gray, orchestra leader on the Bob Crosby radio program. The new rainwear was introduced by the Crosbys in a special program in the store auditorium, after which the Hollywood visitors went to the Brecksville Veterans' Hospital to entertain the disabled veterans there. A cocktail party sponsored by the O'Neil company was then held at the Mayflower Hotel in Akron, followed by a dinner party at the Portage Country Club, with R. S. Wilson, Goodyear vice president, as host.

H. L. Montgomery has been named mechanical goods district manager of a newly created district for Goodyear at Cincinnati, O. Formerly at Detroit in mechanical goods sales, Mr. Montgomery will operate the new district under direction of O. A. Schilling, eastern sales manager.

William E. Still, director of Goodyear's soil conservation awards program, has been appointed assistant district manager of the San Francisco district. New director of the soil conservation program is J. T. Kearny, Jr., a staffman in auto tire department at Akron.

H. C. Corsaut, instructor at Goodyear's wholesale merchandising school, has been appointed assistant manager of the firm's Pittsburgh district.

Joseph F. Hutchinson, Goodyear sales engineer has been awarded a Sloan Fellowship at Massachusetts Institute of Technology. As one of ten men selected in a nationwide competition, Mr. Hutchinson will enter an intensive one-year program of study of management, economic and social problems of industrial administration.

Dinsmore before NAM

R. P. Dinsmore, vice president in charge of research and development, spoke before the patents and research seminar of the National Association of Manufacturers in Atlanta, Ga., on May 18. The title of his talk was "What Research Means to America."

Dr. Dinsmore said that the destiny of America rests basically on a six-pronged program of research and a popular application of its finding under intelligent leadership. He discussed the influence of research in this country on: (1) natural resources, farm productivity, and allowable population density; (2) public health; (3) the speed and cost of communication and transportation; (4) the standard of living; (5) military security; (6) political and sociological trends.

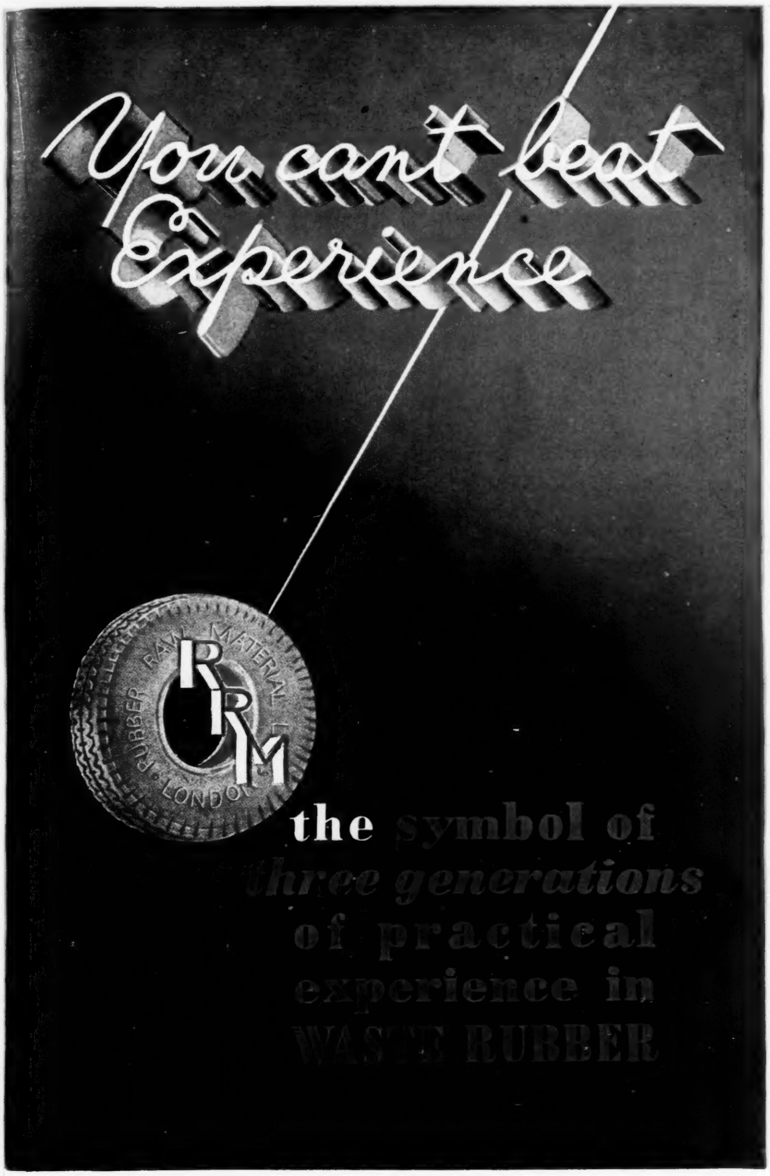
"There is no sound basis for any undue pride of achievement in what we have already accomplished," the speaker said. "No matter how startling and impressive our discoveries have been, or our potential progress in the future, we are suffering and will, no doubt, continue to suffer not from too much knowledge, but from too little."

The solution to greater national wealth, better health and welfare, in his opinion, lies not in government social and old-age benefits, labor agreements, or the private or governmental hoarding of resources, but in a firm determination to develop and exploit the new, the better things of future promise under leadership of intelligent men who believe in the destiny of our country.

Phenoplast Corp., New York, N. Y., has appointed L. Sonneborn Sons, Inc., exclusive national distributer for Phenoplast cold-setting phenolic plastic coatings in the industrial and institutional maintenance fields. Phenoplast is a 100% phenolic resin material which sets without baking or pressure molds and forms an insoluble, infusible coating on wood, composition boards, concrete, and metals. The coating is fire retardant and impervious to salt water, solvents, and acids, it is further claimed.

Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J., recently installed the world's largest precision hydraulic press for vulcanizing conveyer belting. The new 320-ton press uses eight Taylor Fulscope controllers to maintain proper platen temperature, according to a recent issue of *Taylor Technology*, house organ of Taylor Instrument Cos., Rochester, N. Y. This marks the third time in the 55-year history of Manhattan that the company has installed the largest platen press. In 1898 the company set up a press 25 feet long and 50 inches wide to vulcanize the first conveyer belts. In 1913, Manhattan installed a press 36 feet long to process an order for 13,500 feet of conveyer belting for copper mining in South America.

Manhattan Rubber recently honored its 600 Pioneers at their fifth annual dinner. The veterans, who have been with the company more than 25 years each, were welcomed by company Vice President John H. Matthews.


You can't beat Experience
RUBBER RAW MATERIAL
LONDON
RRM
the symbol of
three generations
of practical
experience in
WASTE RUBBER

Packaging Exposition

The National Packaging Exposition, sponsored by the American Management Association, was held in Convention Hall, Atlantic City, N. J., on May 10 to 13, in conjunction with the AMA's conference on packaging, packing, and shipping. The exposition, the most comprehensive in the 18-year history of the show, included displays by some 200 manufacturers of machinery, equipment, materials, supplies, and services of all types.

Plastic containers were featured at the show as providing the necessary sales stimulus in the current competitive market.

According to Frank H. Carman, general manager of the Plastic Materials Manufacturers Association, "Plastic packaging, with its built-in sight appeal, is a silent salesman of proven ability. By actual test, recently, lightweight full-view containers of plastic sheeting outsold 'blind' opaque packages containing the same product by six to one."

The tremendous expansions of the plastics industry makes these versatile materials freely available to the estimated current market for transparent packaging film of 265,000,000 pounds a year. Mr. Carman noted that plastic packages with re-use value to the purchaser have an added sales stimulus and are an important development in the packaging field.

Other developments noted by Mr. Carman included the use of plastics coatings on the surfaces of fiber shipping drums; combination packages of plastic with boxboard, foil, or metal to give a three-dimensional exhibit of the merchandise; increased production of automatic machines for manufacturing transparent plastic containers; and the increasing adoption of plastic dispenser-type containers.

Among the exhibitors at the show were B. F. Goodrich Chemical Co. and E. I. du Pont de Nemours & Co., Inc. The Goodrich Chemical booth displayed a variety of packaging containers, papers, liners, and wraps coated with Geon latex or made from Geon polyblend. A coating machine was in operation demonstrating how readily the Geon latices can be applied to paper surfaces. Some of the products shown were molded closure liners, coated board cake packages, fiber drums, coated papers for milk containers, and others.

The Du Pont exhibit showed how polyethylene protects the products of six industries; food, clothing, chemicals, rubber, metals, and cosmetics. The display comprised three panels. The first showed polyethylene molding powders and principal molded and fabricated forms. The second panel listed the facts about polyethylene of interest to packaging manufacturers, with examples of typical applications. Examples of blow and injection molded polyethylene bottles and containers were shown on the third panel.

Farrel-Birmingham Co., Inc., Ansonia, Conn., on May 16 announced an association with C. A. Lapp & Co., Cleveland, O., to handle the sale of Farrel gears and gear units in Cleveland. Mr. C. A. Lapp, who will devote his time to this sales endeavor, is well known to manufacturers in northern Ohio, having represented W. R. McDonough & Co., manufacturers' agent, in this area from 1942 until December, 1948, when he resigned as sales manager of the McDonough firm to form his own company. Prior to 1942, Mr. Lapp had several years of industrial sales experience handling varied products throughout the Midwest territory.

Ray P. Rossman

Cabot Transfers Rossman

Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass., has assigned to its technical service staff Ray P. Rossman, since July, 1946, manager of the southwestern rubber testing laboratories for Cabot Carbon Co., Pampa, Tex. He will be in active contact with rubber manufacturers and their laboratories and technical people throughout the United States and Canada. As technical liaison representative between customers and Cabot carbon black manufacturing operations in Texas, he will bring customer problems directly to the principal source of carbon black development work and manufacturing control. Although Mr. Rossman will report to F. H. Amon, technical director of Cabot in Boston, he will continue to maintain his residence in Pampa.

Mr. Rossman received a B.S. degree in chemical engineering from the South Dakota State School of Mines & Technology in 1934 and his master's degree in physical chemistry from Massachusetts Institute of Technology in 1936. Since coming to Cabot in 1937, Mr. Rossman has been actively engaged in the carbon black problems, including fundamental research work on carbon black as a reinforcing pigment and in rubber compounding development, and in 1944 was placed in charge of the rubber compounding and testing group of the Boston laboratory.

T. Cabot Addresses World Affairs Council

Laws to enforce competition and prevent internal trade barriers are the principal need of foreign countries today, according to Thomas D. Cabot, vice president of Godfrey L. Cabot, Inc. Speaking on "Our Economic Foreign Policy" at a dinner-meeting of the World Affairs Council, on May 19 at Philadelphia, Pa., Mr. Cabot endorsed the ECA program, but suggested that it be broadened to insist that foreign governments guarantee protection of private investment. The speaker urged that our economic foreign policy should be to use our wealth to promote our free enterprise system abroad and not merely to make grants to foreign governments to be used to build industries which will be controlled or owned by the state. American industry can be relied upon to hold its own in world markets provided the competition is not made unequal by government ownership and control of foreign competitors, Mr. Cabot declared.

Hewitt Appointments

John Burkhardt has been made traffic manager of the Hewitt Restfoam Division, Hewitt-Robins Inc., Buffalo, N. Y. He is also continuing in the same capacity in the Hewitt Rubber Division, where he has served for many years.

Appointment of two new sales representatives to handle Hewitt mechanical rubber products also was announced: Thomas P. McNiesh, assigned to the Los Angeles, Calif., territory, and Hall S. Derkin, stationed in Chicago, Ill. Mr. McNiesh, associated with the rubber industry since 1938, will represent Hewitt in the oil fields and industrial markets. Mr. Derkin, has been in the rubber industry since 1939.

New Wire Wheel Brush

The new Hewitt Rubberlokt rotary wire wheel brush, said to be a completely new and revolutionary rotary wire brush with bristles embedded or locked in rubber centers, has been reported by Hewitt Rubber Division. This new brush has increased service life, since the Rubberlokt core eliminates localization of bristle fatigue by allowing the wire bristles to flex over a gradual arc of their entire length. The bristles, therefore, are not prematurely broken and may be worn down to the rubber flange. The flexibility of the rubber core enables the bristles to return upright after each contact with the surface being brushed. Another feature of the brush is increased and more efficient production, since the flexible wires continuously maintain the maximum number of cutting points in contact with the work. Furthermore the brush face will hold its position and readily conform to uneven surfaces. The Rubberlokt construction causes the brush to react as does a belt to a crowned pulley. Other claimed features of the new brush are better quality work; less fatigue to the operator and tools; reduced production costs; and safer operation. Hewitt is presently producing six-, eight-, and 10-inch industrial sizes, and additional sizes will be available as production increases. The brush can be used on either bench or portable tools.

Pennsylvania Rubber Co., Jeannette, Pa., has announced the Rock Lug Logger, a new off-the-road truck tire. Designed for operations such as strip mining, quarrying, logging, and construction work, the new self-cleaning tire has heavy, chip-proof, S-curved lugs for maximum traction. According to R. B. Cave, vice president in charge of sales, the new tire is available in all popular sizes for off-the-road vehicles.

Fidelity Machine Co., Inc., Philadelphia, Pa., now supplies four 10-pound cones of Avisco tire yarn with each of its standard hose reinforcement machines. These machines simultaneously knit a single or double layer of yarn reinforcement over rubber tubing at a speed up to 20 feet a minute and are used in making garden, radiator, and other general-purpose hose. American Viscose Corp., maker of Avisco yarn, was informed by Fidelity Machine that the 2200/980 Avisco tire yarn has been found to be the best tried in experiments with the reinforcement machine and, as such, is being recommended to machine purchasers. The new machines are meeting widespread acceptance since each can produce as much hose as six braiding machines.

U. S. Rubber Appointments

United States Rubber Co., Rockefeller Center, New York 20, N. Y., on May 16 announced the completion, ahead of schedule, of installation of equipment needed to produce its share of "cold rubber" at the Borger, Tex., plant it operates for the government. The first plant to complete the authorized conversion to "cold rubber," it is stepping up production of the rubber to a rate of 5,000,000 pounds a month and anticipated turning out 3,200,000 pounds in May, according to J. C. H. Wendes, synthetic rubber operations manager.

Appointment of C. H. Madsen as plant manager of the synthetic rubber plant operated by the company at Borger, Tex., was announced May 6. Mr. Madsen, plant manager for Canadian Synthetic Rubber Co., Ltd., Sarnia, Ont., which he had joined in 1943, succeeds G. A. Graham, who has been transferred to U. S. Rubber's New York office.

Sheldon Fisher has been appointed manager of the wholesale merchandising department of U. S. Tires division, and S. R. Milburn has been appointed assistant manager of the department. Mr. Fisher joined the rubber company in 1946 and most recently was manager of dealer development. Mr. Milburn came to U. S. Rubber in 1945 as manager of the U. S. Tires service department at New York and one year later was made retail merchandising manager. In his new position he will concentrate on sales through oil jobber outlets.

L. E. Goodrich has been appointed assistant manager of the cycle tire department. He came to the company in 1931 at Naugatuck, Conn., in the credit department, and then spent several years in Midwest branches in credit and sales before transferring to New York in 1946 to take charge of cycle tire advertising and sales promotion.

Donald A. Buchanan has been appointed Omaha district manager for U. S. Tires division. He joined U. S. Rubber in 1934 at Portland, Oreg., in the mileage service department and has served since 1947 as truck tire sales representative for the Denver district.

Appointment of James E. Power as manager of national accounts sales for the mechanical goods division was announced recently by Walter F. Spoerl, general sales manager for the mechanical goods, general products, Lastex yarn and rubber thread divisions of the company. At the same time Mr. Spoerl also announced the appointment of W. A. Tipton as manager of branch sales for the mechanical goods division and O. S. True as district sales manager for the division's New York branch.

Mr. Power joined the rubber company in 1906 as a salesman; in 1926 he became manager of the mechanical goods division's New York branch, and in 1937, eastern sales manager for the division.

Mr. Tipton started as a salesman for U. S. Rubber in 1935, working out of Houston, Tex., was named product manager for industrial packing and expansion joints in 1937, and in 1942 was placed in charge of district sales for the division's New York branch.

Mr. True came to the company in 1928 as assistant to the sales manager for hard rubber products, in 1933 was made manager of hard rubber sales, and in 1936, product manager for the tank lining and roll covering department.

Edward L. Lockman has been made manager of tank lining and roll covering sales. He joined U. S. Rubber in August, 1934, as a salesman in New York; in 1938 became assistant sales manager of roll covering and tank lining; from 1942 to 1945 served in the U. S. Army; and returned as assistant sales manager of roll covering and tank lining sales in December, 1945.

J. J. Milam has been appointed assistant to J. W. Solomon, general sales manager of the textile division. He joined the rubber company in 1940 at Hogansville, Ga., handling production scheduling, was transferred to New York in 1941 and placed in charge of sales and production coordination, and for the past few years, because of expansion in textile division sales activities, has handled the sale of industrial yarns and fabrics.

Bingham Bros. Co. will act as exclusive eastern sales distributer for all synthetic rubber inking rollers manufactured by U. S. Rubber for the graphic arts industry, according to a joint announcement by the two companies. Bingham services the printing industry in 17 states along the eastern seaboard, operates four composition roller plants, and maintains sales offices and representatives in all principal eastern cities. The two companies have worked in close cooperation for the past two years field testing synthetic rubber inking rollers. Rollers have been developed which double press speeds and give more uniform distribution over the form. Synthetic rubber rollers have been satisfactory at press speeds of more than 1,400 feet a minute. U. S. Rubber is enlarging and streamlining the synthetic rubber roller production facilities at its plant in Providence, R. I.

Binney & Smith Co., 41 E. 42nd St., New York 17, N. Y., held a three-day general sales meeting on April 26 to 28. A feature of the meeting was an all-day symposium on "cold rubber", carried out at the Brooklyn research laboratories of Columbian Carbon Co. Informative talks on latest developments in "cold rubber" compounding were presented by W. B. Wiegand, Columbian Carbon vice president in charge of research, and several members of his staff. The remaining two days of the meeting were devoted to a discussion of current sales problems and plans for the future under the direction of J. M. Hamilton, assistant to the president of Binney & Smith. Attending the meeting, in addition to the New York technical and sales staffs, were E. H. Baker, R. H. Marston, Jr., and L. W. Reeves, all of the Akron office; A. W. Bryant, of the Boston office; G. H. Brannan, Philadelphia; J. F. Stiff, Lansing, Mich.; and E. G. and C. M. Croakman, of Binney & Smith, Ltd., Toronto, Ont., Canada.

Philip Carey Mfg. Co., Cincinnati, O., recently held its annual directors' meeting at which John W. Humphrey, executive vice president was elected president to succeed Robert S. King, now chairman of the board, an office formerly held by George A. Rentschler who continues as chairman of the company's executive committee. Mr. Humphrey, who came to Carey in October, 1948, has been identified with such concerns as General Motors, National Cash Register, and International Telephone & Telegraph Corp.

At the same time Carey directors, in replacing E. W. Smith, resigned, made General Sales Manager L. W. Clarke vice president in charge of sales. He has been with the company since 1935 and has had wide experience in the fields of sales and engineering.

Goodrich Chemical Developments

The phenolic industry is rapidly accepting the new powdered Hycar rubber for phenolic blending, according to J. R. Hoover, vice president-sales, B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, O. Use of Hycar rubber in certain phenolic compounds has been hampered somewhat by the physical state of slab rubber, but the new powdered form can be utilized in any proportion in all mixes with no change in processing technique. The finely divided rubber powder is also suitable for use in many other industries which employ short mixing cycles, such as the concrete industry.

In phenolics, the rubber powder is thoroughly blended with the resin and fillers, and when the batch is hot milled, the resin and rubber fuse together, coating the filler particles. Typical of the new Hycar-phenolic molding compound blends are General Electric Co.'s Compounds 12446, 12487, and 12489. These compounds possess the good moldability and heat resistance of wood flour-filled phenolic and have been further strengthened by the toughness and resiliency of Hycar rubber to the point where they can satisfactorily replace cotton flock and rag filled compounds for many applications.

A solvent solution of blended Hycar rubber and phenolic resin has made possible the production of millions of pairs of cemented non-leather footwear, according to the Compo Shoe Machinery Corp., Boston, Mass. In 1928, Compo developed a process of attaching outsoles to shoes by means of an adhesive, instead of the usual stitching. With the adoption of non-leather soles, standard cements were unsatisfactory for such use, and the company developed a suitable adhesive based on a Hycar-phenolic blend. Compo has used this cement to bond soles made of natural and synthetic rubbers, polyvinyl chloride, wood, vinyl-impregnated fabric, cork-and-rubber, etc., to shoe uppers made from nylon, silk, vinyl sheeting, coated fabrics, etc.

Sealtite electrical wiring, conduit, made by American Brass Co., consists of flexible, galvanized steel tubing covered with a smooth, abrasion resistant, moisture- and oil-proof protective jacket made from Geon plastic, a product of Goodrich Chemical. Designed especially for the machine tool industry, the conduit is made in sizes ranging from 3/8-inch to two inches and is also used in other industries to protect electrical wiring exposed to moisture, oil, acid fumes, grease, dirt, and chemicals. Easy to install and keep clean, Sealtite conduit is furnished in long lengths which are cut and assembled by the user, eliminating scrap waste.

Use of Geon latex in its fiber shipping drums has given Continental Can Co. abrasion resistance improved over that of coating lacquers, high gloss which gives the drums an attractive appearance, and a surface which can be easily washed. Spillage during packing of the drums necessitates washing of the exterior surface, a difficult procedure when no coating or an inadequate coating is used.

Commercial Chemical Development Association, New York, N. Y., recently elected officers for 1949-50, including C. W. Walton, of Minnesota Mining & Mfg. Co., St. Paul, Minn., as treasurer, and W. B. Plummer, Indoil Chemical Co., Chicago, Ill., as a director.

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Reichert Buys Nazar Interests

Sale of all the stock interest in the Toledo Industrial Rubber Co. to Paul F. H. Reichert, president and general manager of the Reichert Float & Mfg. Co., Toledo, O., was announced last month. Mr. Reichert, who has been elected president and treasurer of the Toledo company, has acquired the interest owned by Alexander R. Nazar, former president of the concern. Mr. Reichert has also purchased the interest of Mr. Nazar in the Illinois Industrial Rubber Co., at Ladd, Ill., which was founded by Mr. Nazar in 1947 to serve the Chicago area. Continued operation of both plants on an expanded basis is contemplated, Mr. Reichert said.

Joseph A. Wagner has been named general manager of both plants. Until recently he was in charge of sales engineering for Miami Industries, Toledo. Previously he had been with Bethlehem Steel and Western Electric.

Both rubber companies specialize in mechanical rubber products with large customers in the automotive, glass, and office equipment industries. Plans now under development contemplate increased emphasis on bonding rubber to metal. The Toledo plant is operating on a two-shift basis with 115 employes. Employment at the Ladd plant is approximately 55.

Toledo Industrial Rubber was founded in 1931 as the American Industrial Rubber Co. and reorganized as the Toledo Industrial Rubber Co. in 1936.

General Cable Meeting

Stockholders of General Cable Corp., New York, N. Y., held their annual meeting recently in Perth Amboy, N. J., overwhelmingly approved the pension plan for salaried employes which had previously been submitted by the board, and elected two new directors: A. L. Fergenson, vice president and general counsel; and J. K. Schneider, vice president and treasurer.

President D. R. G. Palmer told the meeting that he believes returns to industry this year would decline approximately 20-25% from those of last year. He also stated that General Cable in 1948 had spent more than $4½ million in modernizing and reequipping certain departments in its plants and, though contemplating completing the programs initiated in the previous year, does not anticipate a capital outlay in 1949 so high as that in 1948.

Mr. Palmer also announced the election as vice presidents of S. A. Smith, in charge of research and development; O. Garner, in charge of manufacturing; and A. D. Pettee, in charge of product engineering.

Sinclair & Valentine Co., 611 W. 129th St., New York 27, N. Y., has announced a new line of SinValastic silk screen process inks, designed for the silk screen processing of most kinds of porous and elastic rubber surfaces, such as sponge rubber articles, aprons, toys, and novelties. These inks may also be used on certain types of prevulcanized rubber. These rubber inks actually fuse and become part of the rubber on which they are screened, it is claimed. They will stretch without cracking or chipping and in this respect are far superior to any lacquer or oil base colors currently used for screening rubber products. The silk-screen process application lends itself to a diversified range of products and is practical for short runs and odd-shaped objects.

Consolidates Subsidiaries

Consolidation by The General Tire & Rubber Co., Akron, O., of its two subsidiaries, Marquardt Aircraft Co., Van Nuys, and General Tire & Rubber Co. of California, South Pasadena, both in Calif., has been completed, according to A. H. Rude, managing director of General Tire's research and development activities in Southern California. The consolidated facility will be known as Marquardt Aircraft Co., whose personnel of 150 has been augmented by another 100 employes from General Tire of California. The manufacturing equipment from the latter concern has also been moved to the Van Nuys factory, with all operations discontinued in South Pasadena.

Mr. Rude stated that the consolidation was a step toward administrative and operating economy. The Marquardt plant has floor space of 100,000 square feet and is engaged in research, development, and manufacture of ramjet and pulsejet engines. The South Pasadena backlog consisted of electronic and special ordnance equipment; this, combined with the Marquardt backlog, approximates $3,000,000. General Tires other subsidiary, Aerojet Engineering Corp., Azusa, Calif., is also engaged in the manufacture of jet propulsion motors, but principally in the rocket powerplant field.

The new Marquardt facility is headed by Roy Marquardt, president and general manager, and M. M. Gilman, executive vice president. Remaining as chief engineer is Don Walter; works manager is Robert Mill, formerly of the South Pasadena facility; William Thomas continues as treasurer; W. M. Farrer as secretary and legal counsel; and customer liaison is under Admiral A. B. Scoles, USN (Ret.).

Holds Factory Managers Conference

Akron know-how sets the pattern for the rubber industry throughout the world, according to William O'Neil, General president. Speaking before a recent conference of the company's foreign factory managers, Mr. O'Neil, who recently returned from a five-week trip to Europe, told the conference that Akron companies control 50% of the rubber business outside of the United States. Most of the world is therefore dependent on rubber developments from this city. Every problem known to the tire industry has come under the scrutiny of Akron chemists and engineers, Mr. O'Neil said, and much of the credit for the tremendous development in synthetic rubber is the result of Akron know-how.

"Our industry has invested more than $25,000,000 in research facilities, and almost every day they are producing new and challenging things. The rubber growers who attended the recent sixth International Rubber Study Conference in London were surprised and somewhat panicky that such progress has been made in the man-made rubber world," Mr. O'Neil stated.

Plant managers at the conference reviewed their programs and progress and were brought up to date on new developments. Among those attending were W. H. Neal, Mexico City; Robert Read, Maipu, Chile; Harry J. Conroy, Caracas, Venezuela; and O. O. Moseley, Lousada, Portugal.

General Electric Co., Schenectady 5, N. Y., at a recent directors' meeting reelected all officers of the company, including Charles E. Wilson and Philip D. Reed as president and chairman of the board, respectively. Besides Ralph J. Cordiner was elected executive vice president and a director.

Mr. Cordiner has been vice president and assistant to the president since February, 1945. He became assistant to the president in July, 1943, after serving during the war as director general of war production scheduling and vice chairman of the WPB. Before the war he was for many years with the company's appliance and merchandise department, becoming manager in 1938. Before entering the department, he had been with Hotpoint, Inc., a G-E affiliate, which he had joined in 1923.

Foster D. Snell, Inc., 29 W. 15th St., New York 11, N. Y., has announced a new and comprehensive service to producers and users of chemicals in its "Monthly Chemical Market Reports." Compiled from publications, the reports will be supplied covering either the entire list of 85 major chemicals and most of the unusual ones, or as specific data on any chemicals. The complete reports are prepared monthly and comprise 225-250 typewritten pages. A full set covering the entire list is furnished monthly at $1,200 a year. Pages referring to a specific chemical are sent at a charge of $2 a full page or $24 a year, whichever is less. Another form of service is to supply past and present accumulated data on any one or more chemicals, also at $2 a page.

L. C. Cartwright was elected secretary, Albert F. Guiteras, treasurer, and Louis J. Bowlby, Jr., assistant treasurer, of Foster D. Snell, Inc., at the corporation's annual meeting last month.

Durez Compounds

(*Continued from page* 341)

ing; while the other compound, Durez 13348, is a flexible type possessing a very low modulus of elasticity.

Durez 13527 is a general-purpose type, although its physical properties are said to be superior to the average general-purpose compounds, and its surface finish is said to be equally good. It was formulated to enable molders to use their present press capacity for much larger molded pieces than heretofore possible. The compound also offers many advantages in transfer and plunger molding; larger molded areas are practical with no increase in clamping pressure. Curing time in compression molding is approximately the same as for other standard Durez general-purpose materials if maximum advantage of electronic preheating is utilized. Available at present only in black and brown, Durez 13527 is especially adaptable for use in molds where care breakage has been encountered; it may also be used for breaking in new molds.

Durez 13348 absorbs shock more readily than wood flour- or flock-filled materials, it is claimed, and requires about half the pressure needed to compression mold standard general-purpose materials. The compound molds equally well by the plunger method and has very good high-frequency preheating characteristics, being less critical than general-purpose material. Durez 13348 is recommended for use in instrument housings, portable radio cabinets, vacuum cleaner hoods, and other applications which encounter hard usage in service.

WEST

Phillips Stockholders Meet

Stockholders of Phillips Petroleum Co., Bartlesville, Okla., gathered in annual meeting on April 26, and approved increasing the common stock from 7½ million to 10 million shares although the board has no plans at present for issuing additional shares. The shareholders also reelected all directors except the company founder and board chairman, Frank Phillips, who had previously requested that he not be a nominee because he wished to leave active management of the company in younger hands. The vacancy thus created on the board went to Philip R. Phillips.

Immediately following the stockholders' meeting the directors convened, discontinued the office of chairman of the board, and created for Frank Phillips the title of honorary director and honorary chairman without any voting or management responsibilities. The board also has amended company by-laws making the president chief executive officer (at present K. S. Adams). All officers were reelected. But Paul Endacott, vice president and assistant to the president, was elected executive vice president; while S. S. Learned, chairman of the operating committee, was made a vice president. H. W. Hinkle had previously been elected assistant comptroller on February 14.

Lawrence R. Sperberg has been appointed manager of market research evaluation in the Philblack sales division of Phillips Chemical Co., a subsidiary of Phillips Petroleum. Mr. Sperberg, formerly manager of the research evaluation and testing sections of the chemical division in Phillips research department, will be located in Bartlesville. For the past nine years he has been associated with carbon black and synthetic rubber evaluation work and with the development of Philblack A and Philblack O. He had joined the Phillips research department in 1940.

Minnesota Mining & Mfg. Co., St. Paul, Minn., has added two new staff members in its new products division: A. A. Blaess, who will handle market development of "fabricated products," and J. M. Rogers, responsible for marketing 3M's fluorocarbon compounds. Mr. Blaess was formerly sales manager of the Inland Rubber Corp.'s industrial products division. Prior to joining the 3M organization Mr. Rogers had been in new product development work with American Cyanamid Co.

Morse Chain Co., Detroit, Mich., subsidiary of Borg-Warner Corp., has announced a new addition to its Morflex couplings. The new product is the Mighty Midget, an all-rubber center coupling designed for improved power transmission in fractional horsepower motors. A neoprene center member is said to give the new coupling a service life as much as 10 times longer than ordinary couplings in its particular power range. Flexing caused by misalignment is absorbed by the entire center member, rather than by sloppy fit of pins. The tight fit of the coupling pins, when pressed into the rubber center, is said to eliminate noise and vibration, resulting in quieter and smoother operation. Shock loads are cushioned, giving longer bearing life and lower replacement costs.

Remodeled Home Office of Stauffer Chemical Co. in San Francisco

Stauffer Chemical Co. recently opened its newly remodeled home office at 636 California St., San Francisco, Calif. Founded in 1885, the firm maintained its general offices on Front St., until the fire and earthquake of 1906, then moved to its present location. The old building was thoroughly renovated, and the new facilities now furnish customers and employes with the most modern comforts and working conditions.

Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill., has expanded its forces at its Newark, N. J., office and moved to larger, more convenient quarters at 212 Essex Bldg., 31 Clinton St. New manager of the district is John D. Riley, successor to George E. Ramsden, who died April 10.

Dow Chemical Co., Midland, Mich., has promoted Donald Williams from general sales manager to director of sales, the position vacated by Leland I. Doan, now company president. Donald K. Ballman, former assistant general sales manager, now fills the position of general sales manager, and L. S. Roehm has been made assistant general sales manager. Dr. Roehm was in charge of the company's technical service and development division and will also continue in this capacity.

Golden Bear Oil Co., 325 W. 8th St., Los Angeles 14, Calif., has appointed H. M. Royal, Inc., and Wetherbee Chemical Co., sales agents for its petroleum products for rubber in the Trenton, N. J., and Buffalo, N. Y., areas, respectively. D. C. Maddy, Harwick Standard Chemical Co., Los Angeles, is sales agent for the West Coast. Representatives in other territories will be announced at some future date.

Department of the Army, Washington 25, D. C., recently announced the awarding of the following contracts: Goodyear Tire & Rubber Co., Akron, O., for 44,582 tank tracks, value $7,133,751; Mohawk Rubber Co., Akron, 27,400 tires, $634,204.

CANADA

Dow Chemical of Canada, Ltd., Toronto, Ont., has according to President N. R. Crawford added three new members to the firm's board of directors and has made two changes in its officers. This action fills the board vacancy created by the death of Willard H. Dow on March 31 and expands membership of the board from six to eight. New directors are Calvin A. Campbell, Donald Williams, and Ralph M. Hunter. All three men hold key positions with The Dow Chemical Co., Midland, Mich., U.S.A., of which Dow Chemical of Canada is a subsidiary. In the parent company Mr. Campbell is secretary and general counsel, Mr. Williams, director of sales, and Mr. Hunter, manager of the electrochemicals division. Concurrently Mr. Williams was elected a vice president of the Canadian company, and Mr. Campbell was elected secretary to replace Leland I. Doan, who resigned following his recent election to the presidency of the parent company. Other members of the Canadian board are Mr. Doan, Mr. Crawford, Earl W. Bennett, Ray H. Boundy, and Leroy D. Smithers.

George Kirlin has been named a vice president of Canada Wire & Cable Co., Ltd., Leaside, Ont. Mr. Kirlin has spent more than 35 years in the wire and cable industry, first with Standard Underground Cable Co. of Canada and now with Canada Wire & Cable.

Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont., has appointed G. F. Turner manager of tire sales and G. M. Roberts manager of the automobile tire department. Mr. Turner has been with the company more than 20 years in a sales executive capacity; while Mr. Roberts has had years of experience in Goodyear branches and as head office staff representative.

Edward G. Wellheiser, general sales manager of British Rubber Co., Ltd., Montreal, P.Q., has been elected a director of the company.

NEWS ABOUT PEOPLE

Michael L. Bayer has been made general plant superintendent of The Mansfield Tire & Rubber Co., Mansfield, O. Mr. Bayer, who joined the company in January, 1930, first worked in its fabric testing laboratory, then was assigned to the development department, tire construction, and other operations, later served as superintendent of the fuel cell division, as superintendent of third shift production, and most recently as superintendent of the curing division.

Harry W. Julian has been made vice president in charge of sales of Better Ball Co., Palmyra, Pa. He is also a director and a member of the firm, which distributes air-inflated rubber balls through novelty, drug, and department stores.

Robert J. Casey has been appointed editor in charge of establishing an employe publication at the Pennsylvania Rubber Co., Jeannette, Pa. He will also supply district newspapers with news items of Pennsylvania Rubber and its employes.

William C. Keeley has been elected executive vice president of U. S. Industrial Chemicals, Inc., 60 E. 42nd St., New York 17, N. Y. Mr. Keeley was a vice president of Air Reduction Co., Inc., from 1936 to 1948 and served as chairman of its finance committee during the past year.

John A. Reid, a former truck tire engineer for Seiberling Rubber Co., Akron, O., in the Atlanta district and recently manager of the tire department for Collord Motors, Inc., New Orleans, La., has rejoined the Seiberling truck tire sales department. Mr. Reid also previously had been employed by the Firestone Tire & Rubber Co. and The B. F. Goodrich Co. and in 1942 had joined the OPA as a business analyst and later became a regional tire rationing officer.

F. B. Davis, Jr., formerly chairman of the board, United States Rubber Co., recently was elected chairman of the board of National Distillers Chemical Corp., New York, N. Y., new subsidiary of The National Distillers Products Corp.

Arthur B. Mullaly on May 2 was elected president of Advance Solvents & Chemical Corp., 245 Fifth Ave., New York 16, N. Y., to succeed his father, Arthur L. Mullaly, the company's founder who died April 19.

Wm. R. Edwards has been appointed sales manager of The Johnson Rubber Co., Middlefield, O., manufacturer of molded and extruded rubber parts for automotive, refrigeration, and other industrial uses. Mr. Edwards was with The B. F. Goodrich Co. for more than 20 years. He served as manager of ordnance sales during the war and has been automotive sales representative since then.

Sidney D. Kirkpatrick, editor of *Chemical Engineering*, last month was elected a vice president of McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y., of which he has been a director since 1936.

Harry M. Mitchell has been named chief engineer of Jefferson Chemical Co., Inc., 30 Rockefeller Plaza, New York 20, N. Y., replacing G. R. Wick, who has been made assistant to the production manager. Mr. Mitchell was formerly Jefferson's assistant chief engineer.

OBITUARY

A. E. Boss

A. E. Boss

ARTHUR EVAN BOSS, manager of pigment sales of the Columbia Chemical Division, Pittsburgh Plate Glass Co., died of a heart attack on May 18 while working in the research laboratory at Barberton, O.

Dr. Boss was born in Great Village, Nova Scotia. After receiving his Ph.D. degree in chemistry at the University of Illinois, he became a research instructor in chemistry at Oberlin College. He next served as research chemist at The B. F. Goodrich Co., Akron, O.

In 1932, Dr. Boss was named to the staff of the Columbia Chemical Division at its Barberton research laboratory and in 1941 was made manager of pigment sales with offices in New York, N. Y. In 1942 he moved to company headquarters in Pittsburgh. A pioneer in the development and use of specialized pigments for modern rubber production, Dr. Boss served during the war and until his death in an advisory capacity at the Office of Rubber Reserve.

Dr. Boss is survived by his wife, his son, a brother, a sister, and his father.

Harry L. Kenyon

HARRY LAURENCE KENYON, vice president of Vulcan Proofing Co., Brooklyn, N. Y., died May 6 at his Huntington, L. I., home. Funeral services for the 78-year old executive were held at the chapel of Green-Wood Cemetery, followed by burial on May 9.

Mr. Kenyon was born in Brooklyn. He was formerly vice president of the C. Kenyon Co. and at the time of his death was also president of the Bay Ridge Dock Co. and chairman of the Brooklyn-Battery Tunnel Committee.

A member of the Brooklyn Chamber of Commerce, the deceased was also a member of the Mayflower Society and the Crescent Club of Brooklyn and Huntington.

Mr. Kenyon is survived by his wife, a daughter, a son, a sister, and a brother.

M. Kenneth Easley

AFTER an illness of several months M. Kenneth Easley, sales engineer for American Zinc Sales Co., Columbus, O., died on April 22. He was 52.

Mr. Easley had been associated with American Zinc since 1921, when he joined as rubber technologist. He received the appointment, which he held at the time of his death, in 1940.

An authority on zinc oxide and its use in rubber and author of papers on the subject, the deceased was also a member of the American Chemical Society, the American Society for Testing Materials, Western Star Lodge #26 F&AM, and of the North Broadway Methodist Church in Columbus.

Surviving are his wife and his daughter.

Edward F. Scheffler

EDWARD FREDERICK SCHEFFLER, supervisor of engineering for Belden Mfg. Co., Chicago, Ill., died of cancer on April 3. Funeral services were conducted April 5 at Reid Memorial United Presbyterian Church, Richmond, Ind., followed by cremation.

Born in Chicago, Ill., on July 11, 1904, the deceased attended Chicago grade schools, Schurz High School, and Illinois Institute of Technology before entering the University of Michigan, from which he received a B.S. degree in 1925. In 1931 he was awarded an M.A. degree by the University of Akron.

He was associated with the Firestone Tire & Rubber Co., from June, 1931, until September, 1934, when he joined Belden. Before Firestone he had also worked for a three-month period for Belden.

Mr. Scheffler was a member of the American Chemical Society.

He is survived by his wife and two sons.

Trade Lists Available

The Commercial Intelligence Branch, United States Department of Commerce, Washington, D. C., recently compiled the following trade lists, of which mimeographed copies may be obtained by American firms from this Branch and from Department of Commerce field offices at $1 a list for each country.

Boot & Shoe Importers & Dealers—Bermuda; Paraguay.

Chemical Importers & Dealers—Bolivia; Guatemala; Israel; Mexico.

Corset, Brassiere, Garter, Suspender & Girdle Manufacturers & Exporters—France.

Dental Supply Houses—Denmark.

Electrical Supply & Equipment Importers & Dealers—Brazil.

Plastic Material Manufacturers & Molders, Laminators & Fabricators of Plastic Products—Denmark.

Rubber Goods Manufacturers—Brazil; Portugal.

Tire Retreaders, Recappers & Vulcanizing Shops—Argentina; Cuba.

Patents and Trade Marks

APPLICATION

United States

2,466,026. **In a Pressure-Proof Gland for a Shaft, Holding Members of Rubber-Like Material for Seal Rings Embracing the Shaft.** G. K. C. Hardesty, Seat Pleasant, Md.

2,466,030. **A Circular Casing Supporting a Separable Elastic Annular Tread in an Abrasive Wheel.** M. E. Landau, Brooklyn, N. Y.

2,466,042. **Internal Heat-Treatment Device Including a Bag of Flexible Material Adapted to Be Inserted in a Body Cavity and Flexible Deliver and Discharge Tubes.** W. J. Reich and M. J. Nechtow, both of Chicago, Ill.

2,466,108. **Artificial Respirator.** T. C. Huxley, III, Riverside, Ill.

2,466,126. **In a Sprinkler Stopper, a Sealing Plate Including a Rubber Pad Portion.** S. Siegel, assignor of one-half to B. and B. R. Schewel, all of Lynchburg, Va.

2,466,142. **Inflatable Rubber Bed Pan.** J. E. Yost, Canton, O.

2,466,211. **In a High-Voltage Testing Assembly, a Pyrolytic Resistor in a Housing of a Resinous Plastic Substance, Remaining Space in the Housing Being Completely Filled by a Viscous Organo-Silicon Oxide Polymer.** J. G. Crockett, Havertown, assignor to Philco Corp., Philadelphia, both in Pa.

2,466,254. **Cellular Elastic Vehicle Tire.** C. B. McKnight, Van Nuys, Calif.

2,466,540. **Bias-Shaped Foundation Garment of Broad Bands of Elastic Material.** F. E. Feigenbaum, New York, N. Y.

2,466,719. **Sponge Rubber Handle Pad.** J. C. MacKearnin, Buffalo, N. Y.

2,466,727. **Denture, Including a Plate Element of a Plastic Composition, a Moldable Lining of a Rubber-Like Compound, and as Bonding Medium for Holding the Lining on the Plate Element, a Separate Film with One Surface Entirely of Balata and the Other Covered with Acrylic Resin.** H. D. Morgan, Youngstown, O.

2,466,793. **In a Boxing Glove, a Pad Portion Including a Cover Tightly Packed with Fragments of Latex Sponge Rubber.** J. P. Corbett, Van Nuys, Calif.

2,466,873. **In a Duplicating Machine Including a Pitted Surface, a Roller, a Rubber-Like Wiper Extending Lengthwise of the Roller.** M. R. Avery, Wauwatosa, Wis., assignor of one-half to R. A. Miller, Chicago, Ill.

2,466,915. **Portable Hair Drier, Including an Inflatable Hood and an Elongated Tapering Tubular Extension.** S. R. Shields, Salt Lake City, Utah.

2,466,943. **Garter Hold of Elastic Material.** P. Z. Gordon, New York, N. Y.

2,467,016. **Neoprene Adhesive for Fibrous Container for Oil and Other Liquids.** C. K. Dunlap, Hartsville, S. C., assigner to Sonoco Products Co., a corporation of S. C.

2,467,036. **In a Coupling for Connection with a Threaded Male Member, a First Member of Rubber-Like Material Having Walls Forming an Internally Threaded Cavity for Receiving the Male Member.** W. C. Iftiger, Sr., Sante Fe Springs, Calif.

2,467,049. **In a Seal for Rotatable Members, a Bead-Like Ring of Elastomeric Material.** C. O. Peterson, assignor to Marlin-Rockwell Corp., both of Jamestown, N. Y.

2,467,061. **In the Combination Including a Valve Pot of a High-Pressure Pump, and a Cover for the Pot, a Gasket of Elastic Material as Seal between Pot and Cover.** J. F. Mason, assignor to Halliburton Oil Well Cementing Co., both of Duncan, Okla.

2,467,210. **Fluid Seal, Including an Annular Rigid Member to Which Is Secured an Annular Body of Resilient Material.** F. A. Helfrecht, assignor to National Motor Bearing Co., Inc., both of Redwood City, Calif.

2,467,312. **In a Shaft Seal Including a Hollow Hub Adapted to Enclose a Rotating Shaft, a Cup Made of Tetrafluoroethylene Resin within the Hollow Hub.** D. E. Jack, New York, N. Y., assignor to Durion Co., Inc., Dayton, O.

2,467,364. **Aviator's Pressure Vest.** J. D. Akerman, Minneapolis, Minn.

2,467,418. **Antiskid Tire Having a Vulcanized Rubber Tread and a Plurality of Abrasive-Filled Frusto-Conical Hollow Casings Embedded in the Tread.** G. A. Alexiadis, Brookline, Mass.

2,467,438. **Making Semi-Stiff Cotton Collars, the Use of a Composition Including an Aqueous Dispersion of Polyvinyl Chloride.** D. McBurney, Newburgh, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,467,487. **Curl Clip Including Two Hair-Pin Shaped Sections Held together by a Rubber Tubing.** L. I. Leon, assignor to I. I. Leon, both of Massapequa, N. Y.

2,467,548. **Rubber Bushing.** D. T. Bradley, Shaker Heights, O., assignor to Harris Products Co., Cleveland, O.

2,467,559. **Ventilating Tubing of Preformed Gas Impermeable Fabric Reinforced by a Lightweight Metal Helix to Prevent Cellapse of the Tubing.** E. F. Mahlberg, Fairfield, Conn., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,467,683. **In a Filler Valve, a Vent Tube in Which Is Mounted a Spreader Element of Flexible Material.** G. L. N. Meyer, Milwaukee, Wis.

2,467,759. **In an Overhung Engine Suspension, a Sandwich Mounting with Opposed Faces Joined to Opposite Faces of a Rubber Element.** H. C. Lord, assignor to Lord Mfg. Co., both of Erie, Pa.

2,467,960. **In a Sealing Unit for Mounting about a Shaft within a Bearing Pocket, and Including a Grooved Cylindrical Casing, Rubber Grommets Mounted in Each Groove.** P. E. Brady, Jr., Muncie, Ind.

2,468,106. **Bust Support of Thin Moldable Flexible and Self-Sustaining Material.** L. L. and D. M. Polk, both of New Orleans, La.

2,468,225-226. **In a Spark Plug Shield, a Detachable, Flexible Elastic Insulating Casing.** L. N. Murphy, Detroit, Mich.

2,468,267. **In Combination with a Helmet, an Earphone Socket Including a Disk of Resilient Material to Which Is Secured a Cushion Ring.** A. M. Mondl, Oshkosh, Wis.

2,468,304 **Tire Fabric of Nylon Cords Held together by an Adhesive Coating Containing Rubber.** A. J. Musselman, Santa Barbara, Calif.

2,468,311. **Annular Rubber Bushing in an Anti-Vibration Mounting or Pivotal Connection.** T. A. Te Grotenhuis, Olmsted Falls, assignor to General Tire & Rubber Co., Akron, both of O.

2,468,315. **In a Sink Fixture Including a Cup-Like Section, a Soft Rubber Annular Gasket in the Bottom of the Cup.** C. P. Wagner, assignor to H. B. Salter Mfg., Co., both of Marysville, O.

2,468,322. **Piston Packing Including an Impervious Resilient Cup.** C. K. Cook, Vallejo, Calif.

2,468,349. **Gun Butt Pad Including a Unitary Boot of Rubber-Like Material Having an Enlarged Rear Compartment Holding a Removable Shock Absorbing Pad of Porous, Resilient Material.** J. A. Stewart, Cuyahoga Falls, O.

2,468,493. **Impervious, Bendable, High-Heat-Resistant Duct Composed of a Pair of Sheets of Fiber Glass Cloth United and Sealed by a Flexible Binding.** F. A. Greenwald, Southgate, assignor to Arrowhead Rubber Co., Los Angeles, both in Calif.

2,468,515. **In Apparatus for Sonic Pulverization and Dispersion of Materials, a Flexible and Resilient Tube to Receive such Material.** T. Robinson, assignor to Lancaster Processes, Inc., both of New York, N. Y.

2,468,558. **In a Tension Cushion Including Spaced Frame Bars and a Link Support Interconnected by Spring Means, a Cushion Pad of Resilient Material Molded about the Link Support.** G. P. Johnson, Waukegan, Ill.

2,468,580. **Instruction Device for Golfers Including a Wrapper of Elastic Material to Be Placed on the Arm over the Crook of the Elbow.** A. H. and B. M. Weis, both of Oakland, Calif.

2,468,589. **Insulating Tape.** R. E. Cryor, Western Springs, and H. J. Cahill, Berwyn, assignors to Union Asbestos & Rubber Co., Chicago, all in Ill.

2,468,721. **Earphone Socket and Noise Shield of Elastic Material.** J. Volkmann, Cambridge, Mass., assignor to The United States of America, as represented by the Executive Secretary of the Office of Scientific Research & Development.

United Kingdom

618,856. **Elastic Suspension for Vehicles.** G. T. Fuery (Etablissements Terrot).

619,030. **Leads for Ignition Systems.** Dunlop Rubber Co., Ltd., and D. Bulgin.

619,325. **Saddles for Cycles, Etc.** Dunlop Rubber Co., Ltd., and D. L. Stephens.

619,389. **Driving Belts.** R. & J. Dick, Ltd., and D. O. Davies.

619,605. **Vehicle Steering Mechanisms.** C. Macbeth and H. Aston.

619,606-607. **Road Vehicle Suspensions and Mountings.** C. Macbeth and H. Aston.

619,618. **Resilient Joints or Mountings.** Associated Equipment Co., Ltd., and G. J. Rackham.

620,072. **Rubber Overshoe.** Tingley Reliance Rubber Corp.

620,294. **Waterproof Capes.** J. C. Paget, Ltd. and L. E. Meade.

620,448. **Resilient Suspensions.** S. A. G. A. Soc. Applicazioni Gomma Antivibranti.

620,449. **Variable Condensers.** S. A. G. A. Soc. Applicazioni Gomma Antivifranti.

620,450. **Suits for Underwater Wear.** Pirelli Soc. per Azioni.

620,899. **Insulating Bushings.** Westinghouse Electric International Co.

620,991. **Coaxial Cable for Transmission of Energy at High Frequency.** Cie General d'Electricite.

621,010. **Respiratory Gas Masks.** Englebert & Co., and L. A. J.-B. G. Dautrebande.

621,040. **Adhesive and Laminated Structure.** W. W. Triggs (Wingfoot Corp.).

Dominion of Canada

414,367. **Laminated Material, Including Layers of an Oil-Resistant Organic Plastic, an Unvulcanized Rubber Composition, and a Sponge Rubber.** H. W. Adam, Montclair, N. J., U.S.A.

455,457. **Fowl Picker, Including a Rotatable Drub-Shape Member on Which Sponge Rubber Teeth Are Arranged.** F. Hanshaw, Port Huron, Mich., U.S.A.

455,524. **Submarine Cable in Which at Least One Conducting Core Is Insulated with Solid Polythene.** J. C. Swallow, Northwich, Cheshire, and M. W. Perrin, assignors to Imperial Chemical Industries, Ltd., both in England, assignor to Canadian Industries, Ltd., Montreal, P.Q., and Canadian Industries, Ltd., has re-assigned to Imperial Chemical Industries, Ltd.

455,600. **Unitary Hair Curling Device of Molded Rubber.** P. T. Coloccia, Hillside, N. J., U.S.A.

455,608 **Inflatable Rubber Bag as Sock Stretcher.** W. A. E. McCarthy, Hamilton, Ont.

455,612. **For Display Mannequins, Skull Cap with Elastic Gussets and Flap.** B. A. Nailer, Toronto, Ont.

455,705-706. **Concentric Conductor Cable.** W. K. Weston and E. Baguley, both of London, England, assignors to International Standard Electric Corp., New York, N. Y., U.S.A.

455,793. **Elastic Ankle Support.** J. Brand, Pittsburgh, Pa.

455,861. **Sealing Sheet Metal Boxes, the Use of a Strip of Metal Foil Faced with a Thermosoftening Elastomer.** T. Baron and R. Weinberger, assignors to Carreras, Ltd., all of London, England.

455,869. **Housing for Radar Equipment Made of Tough Thermoplastic Cellular Material Including Vulcanized Rubber and Thermoplastic Resin.** L. E. Daly, Osceola, and J. F. Schott, Mishawaka, both in Ind., U.S.A., assignors to Dominion Rubber Co., Ltd., Montreal, P.Q.

455,875. **Radio-Frequency Cable Having Polyethylene Insulation and a Jacket of Vinyl Resin.** B. H. Maddock, Fanwood, N. J., assignor to Federal Telephone & Radio Corp., New York, N. Y., both in the U.S.A.

455,883. **Tire Casing Patch.** J. A. Beckett, assignor to General Tire & Rubber Co., both of Akron, O., U.S.A.

456,004. **In an Insulated Coil, a Resinous Binder Containing a Resin Derived from an Organic Compound Having the Group $H_2C=C<$.** E. L. Schulman and J. S. Johnson, both of Wilkinsburg, Pa., U.S.A., assignors to Canadian Westinghouse Co., Ltd., Hamilton, Ont.

456,005. **Insulated Conductor, Including a Conductor, a Layer of Polymerized Tetrafluoroethylene, and a Silicone Resin Impregnated Inorganic Fibrous Exterior Layer.** J. J. Keyes, Edgewood, Pa., U.S.A., assignor to Canadian Westinghouse Co., Ltd., Hamilton, Ont.

456,017. **Belting for Conveyer, Power Transmission, etc.** W. Lord, Manchester, England, assignor to Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.

456,043. **Flexible Rubber Bearings in a Cam Lapping Machine.** H. S. Indge, Westboro, assignor to Norton Co., Worcester, both in Mass., U.S.A.

456,067. **Electrical Conductor Insulated with a Layer of Organic Fibrous Material and an Outside Coating of a Cold Drawing Polyester.** C. S. Fuller, Chatham, N. J., assignor to Bell Telephone Laboratories, Inc., assignor to Western Electric Co., Inc., both of New York, N. Y., U.S.A.

456,068. **Abrasion Resistant Covering for an Outdoor Telephone Wire, Including a**

Don't let your market crack . . . plasticize your vinyl upholstery films with

PARAPLEX G-50

You can't blame a customer for losing her temper when vinyl upholstery turns brittle, cracks and splits, when it discolors or becomes tacky. Blame your plasticizers for volatilizing from the vinyl compound . . . for failing under exposure to heat and sunlight . . . for migrating from the compound . . . *for costing you business.*

You'll have no disgruntled customers when you use PARAPLEX G-50 to plasticize your vinyl compounds. PARAPLEX G-50 does not migrate, has extremely low volatility. It resists heat and ultraviolet light, resists extraction by water and oil, by cleaning fluids and perspiration, by the wiping action that constantly assails furniture. In supported or unsupported vinyl upholstery, in vinyl footwear, electrical insulation, thin film, or hose, PARAPLEX G-50 provides a softness and flexibility that's there to stay.

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CALENDERING improves hot-tear strength and surface smoothness during the processing of both light and heavy weight film;

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MOLDING AND EXTRUDING provides extraordinary heat stability at high processing temperatures and in high-temperature electrical applications;

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CHEMICALS FOR INDUSTRY

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THE RESINOUS PRODUCTS DIVISION

Washington Square Philadelphia 5, Pa.

The Resinous Products Division was formerly The Resinous Products & Chemical Company

Textile Fabric Impregnated with a Material from the Class of Cold Drawing Superpolyesters and Superpolyamides. C. S. Fuller, Chatham, and A. R. Kemp, Westwood, both in N. J., assignors to Bell Telephone Laboratories, Inc., assignor to Western Electric Co., Inc., both of New York, N. Y., both in the U.S.A.

456,137. **Heavy Current, Floating Electric Cable.** J. Urmston, Montclair, N. J., U.S.A., assignor to Callender's Cable & Construction Co., Ltd., (in voluntary liquidation) by H. Hockley, liquidator, assignor to British Insulated Callender's Cables, Ltd., all of London, England.

456,139. **In a High-Tension Electric Cable, a Laminated Dielectric Body Built Up of Superposed Helical Lappings of Strips of Polythene or of a Mixture of Polythene and Polyisobutylene.** L. G. B. R. McL. Fairfield and D. T. Hollingsworth, assignors to Callender's Cable & Construction Co., (in voluntary liquidation) by H. Hockley, liquidator, assignor to British Insulated Callender's Cables, Ltd., all of London, England.

456,164. **In a Microtome, a Resilient Bushing.** W. A. Ladd, Brooklyn, assignor to Columbian Carbon Co., New York, both in N. Y., U.S.A.

456,172. **In a Brassiere, Elastic Breast Supporting Sections.** J. J. Lo Cascio, Bayonne, N. J., assignor to Even-Pul Foundations, Inc., New York, N. Y., both in the U.S.A.

PROCESS

United States

2,466,271. **Electric Power Transmission Cable.** H. Pfleumer, New Brunswick, N. J., assignor to Rubatex Products Inc., New York, N. Y.

2,466,387. **Sealing the Ends of Duplex Insulated Webs in Roll Form.** W. C. Curtis, Jr., Pittsburgh, Pa., assignor, by mesne assignments, to Shellmar Products Corp., Mt. Vernon, O.

2,467,133. **High-Frequency Electric Field Heating to Produce Uniform Welds in a Stack of Organic Thermoplastic Films.** C. R. Irons, assignor to Dow Chemical Co., both of Midland, Mich.

2,467,213-214. **Synthetic Rubber Spinning.** E. L. Luaces, assignor to Dayton Rubber Co., both of Dayton, O.

2,467,553. **Wet-Spinning Acrylonitrile Polymers.** W. A. Hare, Kenmore, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,467,642. **Coating a Rigid Section of Tubing, Rods, Etc., with a Wear-Resistant Plastic Material.** O. C. Wilson, Lakewood, and P. S. Britton, Bratenahl, assignors, by mesne assignments, to Samuel Moore & Co., Mantua, all in O.

2,467,769. **Removal of Volatile Substances from Aqueous Dispersions of Elastomeric Materials.** R. W. Morrow, Wilmington, Del., and J. L. Parsons, Carneys Point, N. J., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,468,165. **Sheathing a Cable with an Elastic Composition Including Polyvinyl Resin.** J. E. Brister, Summit, and C. J. Burch, Plainfield, both in N. J., assignors to Bakelite Corp., a corporation of N. J.

2,468,239. **Securing Rubber to a Ferrous Metal.** A. J. Saulino, Detroit, Mich., assignor to United States Rubber Co., New York, N. Y.

2,468,585. **Flexible Pellicle from a Fluid Plastic.** R. Bluma, Asnieres, assignor to S. A. des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, Chauny & Cirey, Paris, both in France.

2,468,697. **Deep Drawing Organic Plastic Sheets.** F. E. Wiley, West Hartford, assignor to Plax Corp., Hartford, both in Conn.

Dominion of Canada

455,564. **Resin Impregnated Article.** T. W. Rosebaugh, Oakland, assignor to Shell Development Co., San Francisco, both in Calif.

455,669. **Obtaining Rubber or Rubber-Like Material from an Aqueous Dispersion thereof.** S. D. Taylor, E. W. Madge, and E. A. Murphy, all of Erdington Birmingham, England, assignors to Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.

455,743. **Dry-Spinning Solutions of Polymerized Vinyl Compounds.** A. F. G. Mouchiroud and J. A. Trillat, both of Lyons, assignors to Société "Rhodiaceta," Paris both in France.

455,914. **Shaped Rubber Articles.** C. J. Crowley, assignor to Seamless Rubber Co. both of New Haven, Conn., U.S.A.

455,915-916. **Rubber Gloves.** C. J. Crowley, assignor to Seamless Rubber Co., both of New Haven, Conn., U.S.A.

455,917. **Closing the Slitted End of a Planar Receptacle of Vulcanized Material.** B. Predmore, assignor to Seamless Rubber Co., both of New Haven, Conn., U.S.A.

456,034. **Thermoplastic Insulated Electric Conductors.** J. Harvey, Caterham, assignor to W. T. Henley's Telegraph Works Co., Ltd., London, both in England.

456,138. **Polyvinyl Resin Insulated Electric Wires and Cables.** E. Tunnicliff, assignor to Callender's Cable & Construction Co., Ltd., (in voluntary liquidation) by H. Hockley, liquidator, assignor to British Insulated Callender's Cables Ltd., all of London, England.

456 246. **Elastic Coil Cables with Connecting Tails.** R. D. Collins, Beverly Hills, Calif., assignor of one-half to Kellog Switchboard & Supply Co., Chicago, Ill., both in the U.S.A.

United Kingdom

618,885. **Molding Articles of Synthetic Resins.** K. W. Mieszkis.

619,274. **X-Ray Screens.** United States Rubber Co.

619,295. **Injection-Molded Reinforced Articles of Plastic Material.** E. A. Chapuis.

619,421. **Embossing Thermoplastic Materials.** British Thomson-Houston Co., Ltd. and R. Keitley.

619,440. **Electro-Forms.** Printing & Allied Trades Research Association, Research Association of British Rubber Manufacturers, W. H. Banks, P. B. Upton, and J. R. Scott.

619,623. **Plastic Materials Showing a Color-Graduation Effect.** Soc. des Usines Chimiques Rhone-Poulenc.

620 106. **Seamless Tubes.** United States Rubber Co.

620,208. **Golf Balls.** B. Bogaslowsky.

620,390. **Coated Elastic Fabric.** Sylvania Industries Corp.

620,685. **Continuous Stamping of Thermoplastic Materials.** S. P. A. Lavorazione Materie Plastiche.

620,857. **Thermoplastic Insulated Wires and Cables.** Telegraph Construction & Maintenance Co., Ltd., and B. F. Thorne.

CHEMICAL

United States

2,465,991. **Purifying High-Boiling Esters of Acrylic and Alpha-Substituted Acrylic Acids.** A. W. Anderson and C. A. Sperati, both of North Arlington, N. J., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,466,027. **Compounding Natural and Synthetic Rubber Sponge Stock.** A. G. Horney and G. H. McFadden, assignors to Ohio State University Research Foundation, all of Columbus, O.

2,446,038. **Composition Including One Part by Weight of Polyethylene and 0.1-1.5 Parts by Weight of Finely Divided Calcium Carbonate.** E. L. Midwinter, London, and R. B. Richards, Northwich, both in England, assignors to Imperial Chemical Industries, Ltd., a corporation of Great Britain.

2,466,040. **Synthetic Resin Molding Composition for a Denture Base.** S. Myerson, Brookline, Mass.

2,466,189. **Addition of Fluorine to a Double-Bond of an Acyclic Olefinic Compound.** T. P. Waalkes, Columbus, O., assignor, by mesne assignments, to E. I. du Pont de Nemours & Co. Inc., Wilmington, Del.

2,466,212. **Emulsion Polymerization of Conjugated Diolefins and Vinyl Compounds in the Presence of an Aqueous Phase Containing a Partial Ester Formed from a Fatty Acid and a Poly-Oxyalkylene Derivative of a Compound from the Group of the Hexitols and Their Anhydrides.** J. D. Danforth, Downers Grove, assignor to Universal Oil Products Co., Chicago, both in Ill.

2,466,300. **Continuous Production of a High Molecular Weight, Rubber-Like Copolymer of a 2-Methyl Alkene-1 and a Polyolefin, with the Aid of an Aryl Mercaptan Plasticizer.** D. J. Buckley, Plainfield, N. J., and A. L. Chaney, Baton Rouge, La., assignors to Standard Oil Development Co., a corporation of Del.

2,466,301. **Plasticizing a Copolymer of Isobutylene and a Conjugated Diolefin by Mixing with a Plasticizer of the Group of Monocyclic and Dicyclic Aryl Mercaptans.** J. P. Haworth, Westfield, and F. P. Baldwin, Linden, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,466,340. **Dehydrochlorination of High Molecular Weight Chlorinated Fatty Acids and the Alkyl Esters thereof.** G. R. Van Atta, Berkeley, and W. C. Dietrich, El Cerrito, both in Calif., assignors to United States of America, as represented by the Secretary of Agriculture.

2,466,395. **Polymerization of a Mixture of Methylene Malonitrile and Vinyl Acetate.** J. B. Dickey, assignor to Eastman Kodak Co., both of Rochester, N. Y.

2,466,399. **Thermosetting Composition Including a Mixture of a Polyvinyl Butraldehyde Acetal Resin, an Oil-Soluble Monohydric Para-Substituted Butyl Phenol-Formaldehyde Resinous Condensation Product, and a Thermosetting Ethyl Ether of a Methylol Melamine.** R. D. Dunlop, Longmeadow, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,466 404. **A Polyvinyl Ester of N-Monoethylcarbamic Acid.** W. F. Fowler, Jr., and W. O. Kenyon, assignors to Eastman Kodak Co., all of Rochester, N. Y.

2,466,412-413. **Hydrocarbon-Substituted Halosilanes.** W. F. Gilliam, Schenectady, N. Y., and R. N. Meals, Memphis, Tenn., assignors to General Electric Co., a corporation of N. Y.

2,466,420. **A Beta-Lactene.** H. J. Hagemeyer, Jr., Kingsport Tenn., assignor to Eastman Kodak Co., Rochester, N. Y.

2,466,429. **Hydrocarbon Substituted Halogenosilanes.** D. T. Hurd, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,466,434. **Composition Including Resinous Copolymeric Organo Silicon Oxide Condensation Product and Ethyl Cellulose.** O. K. Johannson, assignor to Corning Glass Works, both of Corning, N. Y.

2,466,501. **Preparing an Ester of an Alpha-Beta Unsaturated Monocarboxylic Acid by Passing Vapors of a Mixture of a Beta-Lactone and an Alcohol through a Reaction Chamber in Contact with an Activated Carbon Catalyst.** T. R. Steadman, Akron, O. and C. E. Feazel, Chevy Chase, Md., assignors to B. F. Goodrich Co., New York, N. Y.

2 466,641. **Noncatalytic Halogenation of Certain Alkylated Acrylonitriles.** G. W. Hearne, El Cerrito, and D. S. La France and T. W. Evans, both of Oakland, assignors to Shell Development Co., San Francisco, all in Calif.

2,466,675. **As Ion Exchange Agents, Sulfonated Phenol-Formaldehyde Resins and Sulfonated Copolymers of Monovinyl Aromatic Hydrocarbons and Polyvinyl Aromatic Hydrocarbons, in Granular Form.** W. C. Bauman, assignor to Dow Chemical Co., both of Midland, Mich.

2,466,744. **Composition Including an Acid-Curing Aminoplast and a Salt of 2-Amino Butanol.** M. J. Scott, Springfield, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,466,774. **Preparation of Plastic Substances from Glycerol-Containing Fermentation Stillage and Dicarboxylic Acids or Anhydrides.** D. A. Legg and M. M. Rayman, assignors to Publicker Industries, Inc., all of Philadelphia, Pa.

2,466,800. **In Oil Phase Gelling and Polymerization of Resins, the Use of a Sulfhydryl Compound as a Promoter of Gelation.** C. F. Fisk, Clifton, N. J., assignor to United States Rubber Co., New York, N. Y.

2,466,810. **Synthetic Rubber Preserved with Aromatic Arsenites.** L. H. Howland, Watertown, and B. A. Hunter, Naugatuck, both in Conn., assignors to United States Rubber Co., New York, N. Y.

2,466,826. **A Vulcanized Synthetic Rubber in Which Is Dispersed a Detergent from the Group of Sulfuric Acid Esters of Fatty Alcohols, Sulfonaphthenates, Sulfosuccinic Acid Esters and Alkyl Aryl Sulfonates.** W. Romaine, Jr., San Mateo, Calif.

2 466,854. **Preparation of a Macromolecular Polycondensation Product from an Omega-Amino Normal Saturated Aliphatic Carboxylic Acid Amide.** T. Koch, Oosterbeek, Netherlands, assignor to American Enka Corp., Enka, N. C.

2,466,889. **Alcohol-Soluble Phenol-Modified Coumarone-Indene Resin.** L. M. Geiger, Edgewood, Pa., assignor to Neville Co., Pittsburgh, Pa.

2,466,963. **Reacting a Polysulfide Polymer with a Compound of the Formula MPM, Where P Is Oxygen or Sulfur, and M Is from the Group of Hydrogen, Alkali Metals, Alkaline Earth Metals and Ammonium, and an Acceptor for P Capable of Combining with P to Produce a Polymer of Lower Molecular Weight Than the Original Polymer.** J. C. Patrick, Morrisville, Pa., and H. R. Ferguson, Trenton, N. J., assignors to Thiokol Corp., a corporation of Del.

2,466,988. **Thermoset Copolymer of Vinyl Chloride and Vinylidene Chloride in Which Is Incorporated Hexamethylene Ammonium Hexamethylene Dithiocarbamate.** T. H. Rogers, Jr., Cleveland, O., and R. D. Vickers, New Rochelle, N. Y., assignors to Wingfoot Corp., Akron, O.

2,467,013. **Passing a Mixture of Acetylene and Hydrochloric Acid over Mercuric Vanadate Catalyst to Produce Vinyl Chloride.** A. J. D. H. M. de Vaissiere, assignor to S. A. des Manufactures des Glaces et Produits Chlorides. M. H. Gold and L. J. Drukker, both of Paris, France.

2,467,028. **Stable Nitro Alkane Sulfonyl Chlorides.** M. H. Gold and L. J. Drukker, assignors to Visking Corp., all of Chicago, Ill.

2,467,033. **Controlling the Oil-Phase Gelation and Polymerization of a Mix Including a Polyhydric Alcohol Ester of an Alphaolefinic Dicarboxylic Acid and an Ethylenic Monomer by Adding a Methylene-Poly(N,N-Dialkylarylamine).** E. C. Hurdis, Passaic, N. J., assignor to United States Rubber Co., New York, N. Y.

2,467,053. **Creaming Synthetic Rubber Latex by Incorporating a Salt of a Weak Acid, a Base, and an Alkali Soap.** J. S. Rumbold, Woodbridge, Conn., assignor to United States Rubber Co., New York, N. Y.

2,467,054. **Increasing the Particle Size of Synthetic Rubber Latices.** J. S. Rumbold, Woodbridge, Conn., assignor to United States Rubber Co., New York, N. Y.

2,467,055. **Resinous Molding Powders.** M. Sans, Lyon, Y. Linizan, Paris, and R. Michon, Saint-Fons, assignors to S. A. des Manufactures des Glaces at Produits Chimiques de Sain-Gobain, Chauny & Cirey, Paris, all in France.

2,467,148. **Lubricating Composition Consisting of Acetylene Black and a Copolymer of a Diolefin and Acrylonitrile.** A. J. Morway, Clark, and D. W. Young, Roselle, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,467 160. **Composition Including an Aminoplast and a Hydroxy Amine Salt.** M. J. Scott, Springfield, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,467,186. **Stable Aqueous Dispersion of Synthetic Linear Polyamide.** T. Le S. Cairns, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,467,196. **Improved Fibers of Hydrolyzed Ethylene/Vinyl Ester Interpolymer.** M. A. Dietrich, Claymont, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,467,205. **Piperazine.** W. F. Gresham and W. M. Bruner, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,467,231. **Addition Polymerization of an Ethylenically Unsaturated Compound Containing Only One Ethylenic Linkage in the Presence of an Iodoso Diacylate Catalyst.** L. M. Richards, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,467,233. **For Shrinkproofing Wool, a Bath Including a Butadiene-1,3 Polymer and at Least One of the Urea-Formaldehyde and Melamine-Formaldehyde Resins, and Containing a Non-Cationic Emulsifying Agent and, as Conditioning Electrolyte, a Water-Soluble Neutral Salt of an Alkali Metal.** J. B. Rust, East Hanover, N. J., assignor to Montclair Research Corp., a corporation of N. J.

2,467,234. **Heating Ethylene with a Mixture Containing Tertiary Butyl Alcohol and Sodio-N-Chloro-p-Toluenesulfonamide to Obtain a Strong, Tough Ethylene Polymer Soluble in Xylene.** D. E. Sargent and W. E. Hanford, both of Easton, Pa., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,467,245. **Preparation of Solid Polymers of Ethylene.** G. M. Whitman, Claymont, and S. L. Scott, assignors to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,467,280. **Di(aryl Sulfonyl) Peroxides as Latent Curing Catalysts for Acid Curing Thermosetting Material.** H. A. Walter, Longmeadow, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,467 322. **Laminar Elastic Structure Including a Layer of Cured Isobutylene-Diolefin Interpolymer, and a Layer of Natural Rubber, Butadiene-Acrylonitrile or Butadiene-Styrene Copolymer, Held together by a Layer of a Mixture of Cured Isobutylene-Diolefin Interpolymer and Either Natural Rubber or Butadiene-Acrylonitrile or Butadiene-Styrene Copolymer.** I. E. Lightbown, Roselle, and N. S. Beekley, Jr., Westfield, both in N. J., assignors, by mesne assignments, to Jasco, Inc., a corporation of La.

2,467,324. **Treating Cellulose Nitrate with Morpholine to Reduce Viscosity.** S. B. Luce, Springfield, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,467,330. **Aliphatic Terpene Derivatives.** N. A. Milas Belmont, Mass., assignor to Union Bay State Chemical Co., Inc., Cambridge, Mass.

2,467,339-340. **Vinyl Aromatic Compositions Containing Colloidal Silica.** R. B. Seymour, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,467,341. **Methacrylate Compositions Containing Colloidal Silica.** R. B. Seymour, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,467,342. **Polyvinyl Acetal Compositions Containing Colloidal Silica.** R. B. Seymour, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,467,352. **Water-in-Oil-Type Emulsion of Vinyl Halide Copolymer.** T. V. Williams, Jr., Niagara Falls, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,467,362. **Calking Composition, Including a Mixture of Oil-Reclaimed Rubber, Zinc Oxide, Colophony, Phenyl-Betanaphthylamine, Bitumen, Acetone-Aniline Condensation Product and Solvent.** R. H. Taylor, Sydney, S. W., Australia, assignor to J. E. Berman, Suffolk, Va., and R. C. Robinson, Seattle, Wash.

2,467,378. **Monomeric 1,1-Dicyano Ethylene Stabilized with a Member of the Class of the Oxides and Sulfides of Phosphorus.** H. Gilbert, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2 467,382. **Copolymerizing Butadiene and Acrylonitrile or Styrene.** C. H. Hempel, Manitowoc, Wis., assignor to Heresite & Chemical Co., a corporation of Wis.

2,467,430. **Interpolymer of Allylidene Diethoxide and Vinyl Acetate.** E. F. Izard, Kenmore, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,467,498. **Synthetic-Resin Adhesive Base from Cresylic Acid and Furfural.** D. V. Redfern, Seattle, Wash., assignor, by mesne assignments, to American-Marietta Co., Chicago, Ill.

2,467,523. **Anion Exchange Resin from a Polyalkylene and a Substituted 1,3,5-Triazine.** J. R. Dudley, Cos Cob, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,467,526-527. **Curing Copolymers of an Unsaturated Alkyd Resin and a Polymerizable Liquid Substance Containing the $CH_2{=}C{<}$ Group.** R. R. Harris, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2 467,550. **Composition Including Chlorinated Solid Polythene and, as a Combined Stabilizer and Lubricant therefor, a Mixture of Litharge and a Hydrocarbon Wax.** D. A. Fletcher, Pompton Plains, and R. S. Taylor, Kearny, N. J., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2 467,774. **Hydrolyzed Interpolymer of Vinyl Acetate with Ethylene.** L. Plambeck, Jr., assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,467,789. **Improving the Processing Characteristics of Natural and Synthetic Rubbers by Incorporating a Zinc Salt of an Aromatic Mercaptan in a Neutral Oxygenated Organic Solvent.** J. J. Verbanc, Tuxedo Park, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,467,796. **Tough Elastic Thermoplastic Composition for Making Patterns Composed of Candelilla Wax, and the Reaction Product Obtained by Heating together Rosin, Glycerol, and a Drying or Semi-Drying Oil.** H. B. Willis, Pittsburgh, Pa., assignor to Westinghouse Electric Corp., East Pittsburgh, Pa.

2,467,832. **Composition Including Gelatin and Polyvinylmorpholineurea.** G. D. Jones, Easton, Pa., assignor to General Aniline & Film Corp., N. Y.

2,467 853. **Preparation of Methyl-Substituted Polysiloxanes.** R. L. Poskitt and G. S. Irby, both of Pittsfield, Mass., assignors to General Electric Co., a corporation of N. Y.

2,467,893-895. **Piperazine Derivatives.** S. Kushner, Montvale, N. J., and L. Brancone Pearl River, assignors to American Cyanamid Co., New York, both in N. Y.

2,467,915. **Composition Including an Acid-Curing Resin and o-Xenyl Phosphoryl Diamide.** M. J. Scott, Springfield, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,467,926-927. **Preparation of Monomeric Alkyl Alpha-Cyano-Acrylates.** A. E. Ardis, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,467,976. **Adding Hydrochloric Acid to a Completely Dehydrated Liquid Polymeric Dimethyl Silicone to Increase Its Viscosity.** J. F. Hyde, assignor to Corning Glass Works both of Corning, N. Y.

2,468,015. **Cyanoethyl-Substituted 1,3,5-Trimethylene Trisulfones.** H. T. Hookway, Croydon, and E. M. Evans, Tonbridge, assignors to British Resin Products, Ltd., London, all in England.

2,468,027. **Emulsion Polymerization of Monovinyl Aromatic Compounds or Aliphatic Conjugated Diolefins in the Presence of an Iron Salt of an Inorganic Acid and a Water-Soluble Peroxide.** E. C. Britton and W. J. Le Fevre, assignors to Dow Chemical Co., all of Midland, Mich.

2,468,054. **Copolymerizing Vinylidene Fluoride with Ethylene or Halogenated Ethylenes in the Presence of a Peroxy Compound.** T. A. Ford, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,468,094. **Casting Compositions Including Methyl Methacrylate and Glycol Dimethacrylates.** B. M. Marks, Newark, N. J., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,468,111. **Polymerizing Ethylenically Unsaturated Organic Compounds in the Presence of a Catalytic Amount of a Salt of Azodisulfonic Acid.** J. A. Robertson, Elsmere, Del., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,468,159. **Vulcanization of Rubber Which Includes Incorporating in a Rubber Composition a Vulcanization Retarder, Sulfur, Zinc Oxide, an Amine Reactive with Carbon Disulfide, an Organic Nitrogen Base Unreactive with Carbon Disulfide, Exposing the Mixed and Formed Rubber Stock to Carbon Disulfide, and Curing.** B. C. Barton, Clifton, N. J., assignor to United States Rubber Co., New York, N. Y.

2,468,208. **Bromine-Containing Organic Compounds.** M. S. Kharash, Chicago, Ill., assignor to United States Rubber Co., New York, N. Y.

2,468,309. **Preservation of a Butadiene-Styrene Copolymer by Incorporating an Acetal of a Hydroxy Aldehyde.** R. L. Sibley, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,468,330. **Breaking Aqueous Emulsions of Polymers of Butadiene, Isoprene, Piperylene, Beta-Myrcene, Styrene, Acrylonitrile or Acrylic Esters.** E. L. Kropa, Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,468,345. **Plasticizing Polyvinyl Alcohol Compositions.** C. A. Porter, assignor to resistoflex Corp., both of Belleville, N. J.

2,468,413. **Resin Composition Including a Phenolic Resin, Hydrocarbon Resin Polymer, and Tung Oil.** F. J. Soday, Baton Rouge, La., assignor to United Gas Improvement Co., a corporation of Pa.

2,468,414. **Composition Including Butadiene-Styrene Copolymer and Hydrogenated Hydrocarbon Resin.** F. J. Soday, Baton Rouge, La., assignor to United Gas Improvement Co., a corporation of Pa.

2,468 432. **Dimerization of Butadiene.** H. L. Johnson, Media, Pa., assignor to Sun Oil Co., Philadelphia, Pa.

2,468,480. **Coating Composition Including a Volatile Aromatic Solvent in Which Is Dissolved a Plastic Base Consisting of Polyethylacrylate and Chlorinated Rubber or Polymeric Chlorinated Isoprene.** C. E. Bradley, Jr., Westport, Conn., assignor to R. T. Vanderbilt Co., New York, N. Y.

2,468,482. **Oil-Resin Blend for Reclaiming Vulcanized Rubber Scrap.** C. H. Campbell, Kent, O.

2,468,523. **Delayed-Action Process for Polymerizing Isobutylene Mixed with a Polyolefin Having 4 to 14 Carbon Atoms per Molecule.** R. M. Thomas, Union, D. W. Young, Roselle, and W. J. Sparks, Cranford, all in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,468,534. **Tough Flexible Polyamide Resin-Hydrocarbon Resin Compositions.** D. W. Young, Roselle, and W. J. Sparks Cranford, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,468,594. **Thermoplastic Cement Including Methyl Acetate, Vinyl Acetate Polymer, Phenol-Formaldehyde Resin and Mica Flour.** G. F. Dustin and R. B. Manning, both of Westfield, N. J. assignors to Western Electric Co., Inc., New York, N. Y.

2,468,713. **Composition Including the Product of Polymerization of a Mass Including a Compound of the Formula $CH_2{=}CH{-}Ar{-}N{=}C{=}O$, Where Ar Is a Divalent Aromatic Hydrocarbon Radical to the Aromatic Nucleu of Which the Vinyl and Isocyanate Groupings Are Directly Attached.** E. L. Kropa, Old Greenwich, and A. S. Nyquist, Cos Cob, both in Conn., assignors to American Cyanamid Co., New York, N. Y.

2,468,716. **Treating Hydrogen-Donor Textile Material with a Reactive Product of Polymerization of a Mass Including an Isocyanate.** A. S. Nyquist, Cos Cob, and E. L. Kropa, Old Greenwich, both in Conn., assignors to American Cyanamid Co., New York, N. Y.

Dominion of Canada

455,499. **Vinyl Resin Coating Compound for Articles Having a Copper Surface.** G. M. Powell, 3rd, South Charleston, W. Va., and E. F. Carlston, Arlington, Va., both in the U.S.A., assignors to Carbide & Carbon Chemicals, Ltd., Toronto, Ont.

455,525. **Bonding Polythene Compositions to Surfaces by Coating a Surface with a Solid Polyalkylene Sulfide Composition and then Applying a Film of Polythene Composition in the Fused State.** H. M. Glass, Middlesborough, G. C. Tyce, Watford, and L. D. Spurr, London, all in England, assignors to Canadian Industries Ltd., Montreal, P. Q., assignor to Imperial Chemical Industries, Ltd., London, England.

455,630. **Acrylonitrile.** F. Porter, Morristown, and G. A. Nesty, Morris Township, both of N. J., assignors to Solvay Process Co., which has been merged into Allied Chemical & Dye Corp., New York, N. Y., both in the U.S.A.

455,632. **Removing Acetylene Polymer Impurities from a Crude Acrylonitrile.** H. S. Davis, Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y.

455,667. **Recovery of Quebrachitol from Rubber Latex Serum.** W. J. Hart, Washington, D. C., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P. Q.

455,691. **Heat Sealable Adhesive Composition Including a Polymeric Vinyl Ether and a Resinous Condensation Product of Acetylene and a Phenol.** I. V. Runyan, Binghamton, assignor to General Aniline & Film Corp., New York, both in N. Y., U.S.A.

455,742. **Composition Including a Rubber and an Unsaturated Cycloaliphatic Ketone Having at Least 12 Carbon Atoms in the Molecule.** W. S. Thornhill, New York, N. Y. and J. A. Perona, Oakland, assigners to Shell Development Co., San Francisco, both in Calif.

455,773. **Removing a Normally Solid Polymerization Inhibiter from Butadiene.** A. J. Gracia, Cuyahoga Falls, assignor to Wingfoot Corp., both in O., U.S.A.

455,775. **Copolymer of Butadiene and Acrylonitrile Plasticized with Isobutyl Beta Isobutoxy Propionate.** A. M. Clifford and J. G. Lichty, Stow, assignors to Wingfoot Corp., Akron, both in O., U.S.A.

455,776. **For Coating Casting Surfaces. Composition Including a Water Solution of a Resin in a Suitable Solvent and Containing Suspended therein a Solid Material Insoluble in the Resin.** A. J. Seitz, assignor to Wingfoot Corp., both of Akron, O., U.S.A.

455,777. **Vulcanizing Rubber Compositions.** P. J. Flory, Kent, and N. Rabjohn, assignors to Wingfoot Corp., both of Akron, both in O., U.S.A.

455,779. **Preventing the Concentration of Impurities in a cycle Process of Producing Rubber Hydrochloride Film.** H. J. Osterhof, Cuyahoga Falls, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

455,782-783. **Production of Interpolymers of Styrene with Polyhydric Alcoholic Mixed Esters.** R. H. Buckle, Birmingham, and E. Buckle, Birmingham, and E. Booth, London, executors of the estate of D. H. Hewitt, deceased, in his lifetime of London, co-inventor with L. E. Wakeford, London, and R. H. Buckle and E. Booth, as such executors, assignors to Lewis Berger & Sons, Ltd., London, both in England.

455,832. **Removing Acetylene Polymers from Crude Acrylonitrile.** H. S. Davis, Greenwich, and H. A. Newey, Stamford, both in Conn., assignors to American Cyanamid Co., New York, N. Y., both in the U.S.A.

455,833. **Polymerizable Composition Including an Unsaturated Alkyd Resin, a Compatible Polyallyl Ester of an Inorganic Polybasic Acid, and a Catalyst for Accelerating Compolymerization.** E. L. Kropa, Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

455,834. **Monofluorodichloroacetonitrile.** I. Hechenbleikner, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

455,852. **Modified Alkyd Resin Coating Composition.** G. F. D'Alelio and J. Underwood, both of Pittsfield, Mass., assignors to Canadian General Electric Co., Ltd., Toronto, Ont.

455,857. **Polymerizing 4-Vinylcyclohexene by Contacting with a Friedel-Crafts Catalyst from the Group of Aluminum Chloride, Boron Trifluoride, Antimony Pentachloride and Ferric Chloride.** S. A. V. Deans, O. C. W. Allenby, and D. A. B. Stevenson, all of McMasterville, assignors to Canadian Industries, Ltd., Montreal, both in P.Q.

455,868. **Solidified Multicellular Plastic Foam Product.** W. J. Clayton, Mishawaka, Ind., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

455,870. **Vinyl Chloride-Fumaric Ester Copolymer.** H. W. Arnold, Wilmington, Del. U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington.

455,910. **Composition Including a Solid Solution of a Resinous Polymer of a Vinyl Aromatic Compound and a Hydrogenated Resinous Polymer of a Vinyl Aromatic Compound.** H. P. Heller, Palmyra, N. J., assignor to Radio Corp. of America, New York, N. Y., both in the U.S.A.

MACHINERY

United States

2,465,992. **Golf Ball Winder.** R. Atti, Cliffside Park, N. J.

2,466,407. **Toy Plastic Molding Apparatus.** R. Friestedt and R. C. Halfer, assignors to Halfer Engineering Co., all of Chicago, Ill.

2,466,587. **Combination of a Thermoplastic Extruder and Cut-off Device.** A. Genovese, Baltimore, Md., assignor to National Plastic Products Co., Odenton, Md.

2,466 643. **Apparatus for Heat Sealing Thermoplastic Strips about Elastic Elements.** S. H. Magid, Larchmont, N. Y.

2,466,934. **Plastics Extruder.** C. E. Dellenbarger, Chicago, Ill.

2,467,440. **Automatic Plastic Molding Press.** V. E. Meharg, A. P. Mazzucchelli and R. E. Nicolson, Bloomfield, N. J., assignors to Bakelite Corp., a corporation of N. J.

2,468,121. **Tire Recapping Mold.** E. F. Shell, San Francisco, Calif.

2,468 629. **Apparatus for Thermoplastically Joining Strips of Thermoplastic Film.** L. A. Herzig and M. Coan, Jackson Heights, assignors of 47½% to L. A. Herzig and M. Coan, and 5% to H. S. Hendricks, Mamaroneck, both in N. Y.

Dominion of Canada

454,729. **Plastic Material Extruder.** H. F. MacMillin and P. C. Pocock, Mt. Gilead, O., assignors to Hydraulic Development Corp., Inc., Wilmington, Del., both in the U.S.A.

454,768. **Apparatus to Form Plastic Material.** G. A. Lyon, Allenhurst, N. J., U.S.A.

454,964. **Apparatus for Continuous Vulcanization of Insulated Electrical Conductors.** C. M. Canfield, Utica, assignor to General Cable Corp., New York, both in N. Y., U.S.A., assignor to Canada Wire & Cable Co., Ltd., Leaside, Ont.

455,025. **Device for the Continuous Coating of an Electric Conductor with Insulating Material in a Multicolored Pattern by Extrusion.** J. M. Keenan, London, England, assignor to International Standard Electric Corp., New York, N. Y., U.S.A.

455,008. **Elastic Test Sample Tester.** I. B. Prettyman and H. G. Hager, assignors to Firestone Tire & Rubber Co., all of Akron, O., U.S.A.

455,178. **Surface Roughness Measurer.** M. Mooney, Lake Hiawatha, N. J., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P. Q.

455,356. **Mold for Corrugating Resin Impregnated Fabric.** J. C. Case and L. S. Meyer, assignors to Libbey-Owens-Ford Glass Co., all of Toledo, O., U.S.A.

United Kingdom

616,678. **Tire Retreading Mold.** H. Simon, Ltd.

617,211. **Automatic Machine for Fitting and Simultaneously Vulcanizing Rubber Soles on Boots or Shoes.** G. M. Capdevila.

617,229. **Lasts for Pressing and Vulcanizing Rubber Footwear.** Bata Narodni Podnik.

617,396. **Apparatus for Heating Dielectric Materials Electronically.** Radio Corp. of America.

617,465. **Device Measuring the Hardness of Rubber and Similar Materials.** Imperial Chemical Industries, Ltd., J. M. Buist, and R. L. Kennedy.

617,613. **Apparatus for Film-Type Distillation.** B. F. Goodrich Co.

617,801. **Presses, Particularly for Vulcanizing.** McNeil Machine & Engineering Co.

617,875. **Plant for Dealing with Loose Granular and Like Materials in Manufacturing and Processing Operations.** Dunlop Rubber Co., Ltd., and H. Willshaw.

618,008. **Rotary Cutter for Use in Preparing Ring Test Pieces of Rubber and Similar Materials.** Imperial Chemical Industries, Ltd., J. M. Buist, and R. L. Kennedy.

618,518. **Plastic Materials Mixer and Extruder.** Soc. P. A. Lavorazione Materie Plastiche.

618,536. **Extruder.** B. X. Plastics, Ltd., and D. C. Nicholas.

618,554. **Apparatus for the Production of Tire Covers.** Dunlop Rubber Co., Ltd., and T. Norcross.

619,260. **Apparatus for Molding Tires on to Toy Wheels.** J. Cortner and J. M. Jackson.

619,446. **Vulcanizing Machines for Repairing Tires and Tubes and Other Articles of Rubberized Fabric.** L. Steiner.

619,675. **Apparatus for Shaping Sheet Thermoplastic Material Centrifugally.** Goodyear Aircraft Corp.

620,334. **Organic Plastic Material Extruder.** Plax Corp.

UNCLASSIFIED

United States

2,466,449. **Tire and Rim Assembly.** R. G. Le Tourneau, Peoria, Ill., assignor to R. G. Le Tourneau, Inc., Stockton, Calif.

2,466,569. **Machine for Simultaneously Applying a Plurality of Tires on a Plurality of Wheels.** W. R. Bishop, assignor to F. & N. Lawn Mower Co., both of Richmond, Ind.

2,466,986. **Valve for Inflation Objects.** G. E. Gott, Arlington, Mass., assignor to Dewey & Almy Chemical Co., North Cambridge, Mass.

2,466,997. **Cable Connector.** C. O. Morris, Van Nuys, assignor to Garrett Corp., Airesearch Mfg. Co. Division, Los Angeles, Calif.

2,467,017. **Anti-Skid Chain.** E. Eger, Los Angeles, Calif., assignor to United States Rubber Co., New York, N. Y.

2,467,520. **Reattachable Gasoline Hose Coupling.** W. Brubaker, assignor to Akron Brass Mfg. Co., Inc., both of Wooster, O.

2,467,654. **Detachable Road Grip for Vehicle Tires.** J. A. Boje, Gentofte, assignor to A. S. Terraincosyndikat, Copenhagen, both in Denmark.

2,467 922. **Hose Coupling.** M. J. Busch and D. F. and F. A. Woytal, Milwaukee, Wis.

2,468,122. **Stripper for Removing the Covering of Covered Wire.** C. C. Shepard, Detroit, Mich.

2,468,338. **Hose Coupling.** W. MacWilliam, Montville, assignor to Resistoflex Corp., Belleville, both in N. J.

2,468,407. **Cable Skinner.** J. H. Pifer, Pasadena, Md.

Dominion of Canada

454,714. **Automobile Tire Chain.** C. H. Reynolds, Donora, Pa., U.S.A.

454,930. **Anti-Skid Device.** A. K. Stevens, Buffalo, N. Y., U.S.A.

454,986. **Liquid Inflating Device for Tires.** J. C. Crowley, Willoughby, assignor to Dill Mfg. Co., Cleveland, both in O., U.S.A.

454,993. **Pipe Coupling.** F. T. Newell, Bradford, Pa., assignor to Dresser Industries, Inc., Cleveland, O., both in the U.S.A.

455,086. **Quick Hose Coupling.** H. C. Krone, River Edge, and W. Meyer, East Orange, assignors to Wheaton Brass Works, Newark, all in N. J., U.S.A.

455,129-130. **Wheel Traction Device.** W. L. Wettlaufer, Buffalo, N. Y., U.S.A.

455,180. **Textile Fabric.** B. H. Foster, Maplewood, N. J., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

United Kingdom

616,987. **Flexible Coupling.** G. Pittaluga.

617,361. **Device Indicating the Completion of the Stroke of the Reciprocating Part of Jacks.** Dunlop Rubber Co., Ltd., and H. W. Trevaskis.

617,567. **Quick Hose Coupling.** H. C. Krone and W. Meyer.

618,243. **Electro-Pneumatic Brake Apparatus.** Dunlop Rubber Co., Ltd., and H. Trevaskis.

TRADE MARKS

United States

442 392. Representation of a figure bending over backward and the words: **"Elastiques Bally."** Elastic girdle webbing. Bally's Shoe Factories, Ltd., Schoneward, Switzerland.

442,447. **Valite.** Thermosetting and thermoplastic molding compounds. Valite Corp., New Orleans, La.

442,487. **Lox.** Cement. Firestone Tire & Rubber Co., doing business as Firestone Industrial Products Co., Akron, O.

442 489. **Texcel.** Pressure-sensitive adhesive tapes. Industrial Tape Corp., New Brunswick, N. J.

442,493. **Araldite.** Synthetic resinous adhesives. Ciba Ltd., Basle, Switzerland.

442,559. **Gem-Dandy.** Brassieres, garter belts, girdles, etc. Gem-Dandy, Inc. Madison, N. C.

442,562. **Thermoflex.** Thermal insulating tape. Johns-Manville Corp., New York, N. Y.

507,176. **Service.** Dater stamps. Fulton Specialty Co., Elizabeth, N. J.

507,186. **Saunterer.** Raincoats. John David, Inc., New York, N. Y.

507,268. **Inter-Up.** Brassieres, girdles, and corsets. Even-Pul Foundations, Inc., New York, N. Y.

(Continued on page 402)

New Machines and Appliances

Atlas Type "E" High-Pressure Reducing Valve

New Reducing Valve

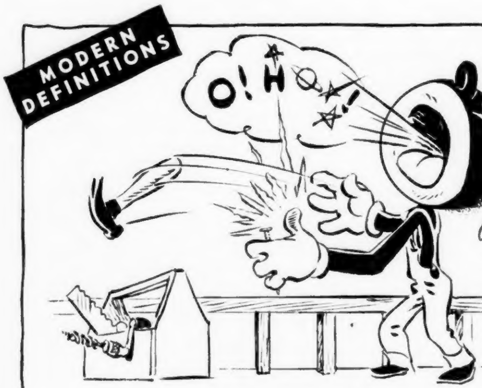
AN IMPROVED high-pressure reducing valve for handling working pressures as high as 6,000 p.s.i. without shock has been announced by Atlas Valve Co., 282 South St., Newark 2, N. J. Known as the Type "E" high-pressure reducing valve, it is recommended for reducing the pressure of water, oil, or compressed air in a single stage to 250 p.s.i. or to within 20% of the initial pressure. For lower reduced pressures the reduction should be made in two stages: the first through the Type "E," and the second through a valve for handling working pressures up to 300 p.s.i.

The valve has a forged steel body, and the internal metal parts are all of hard chromium-plated stainless steel. The one-piece seat stem and piston washers are easily reground and replaced, and the plastic cup piston washers are especially made to suit the high-pressure service. The pressure on the seat is balanced by a piston above; consequently variations in initial pressure have little effect on the reduced pressure. A formed packing of special material, said to be superior to leather, has been adopted which is immune to water, oil, and other fluids commonly used in hydraulic machinery. Adjustments in pressure can be made easily and quickly by means of the hand-wheel at the top of the valve.

Hydraulically Operated Cutting Press

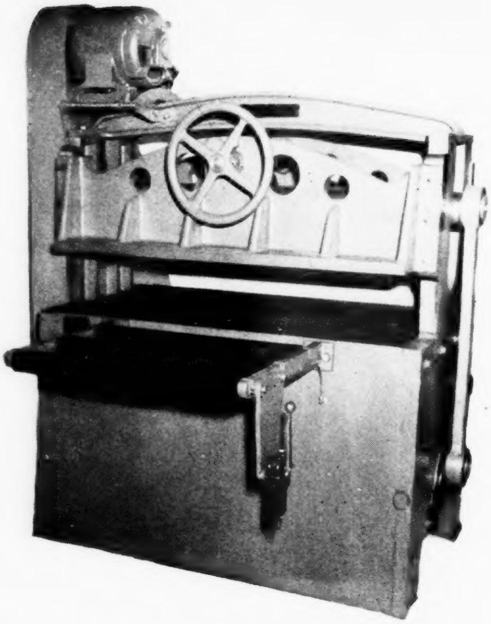
A COMPLETELY new, hydraulically operated, remote control, 60-inch heavy-duty die cutting press of versatile application has been announced by Standard Machinery Co., Mystic, Conn. Now being used in the manufacture of various garment, paper, and rubber products, the machine features finger-tip pressure control of the hydraulically operated lever which controls the friction disk clutch and rugged brake. With complete lever control of the press at all times, the operator can easily jog the head in up and down positions and operate the machine either continuously or intermittently.

Compact, sturdily built, and completely safe, since all moving parts except the head are enclosed, the new 34- by 60-inch press



Philippic?

SEE PAGE 270



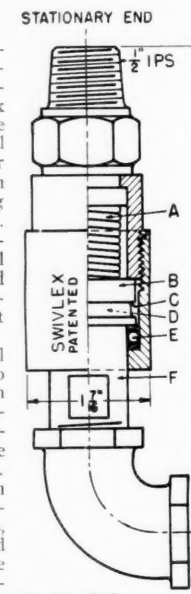
Standard's Heavy-Duty Die Cutting Press

is capable of operating at 15 strokes a minute with instantaneous start and stop operations.

Swivel Joint

SWIVLEX, a new swivel joint suitable for 400 p.s.i. maximum pressure and 600° F. maximum temperature, has been announced by Seamlex Co., Inc., Long Island City, N. Y. The new joint has exceptionally easy swivel owing to an internal equalizing chamber which balances the pressures on both sides of the seat, and a ball bearing which reduces friction in the housing. The new product requires no maintenance whatsoever, since the all-metal construction eliminates packings, and the stainless steel bellows keeps uniform pre-adjusted pressure on the seat to prevent leakage.

Other stated features of the swivel joint include an automatic internal stop which prevents abuse in service; an invisible lock which prevents tampering; and easy turning which eliminates the destructive twist in metal hose if the latter is improperly installed. The Swivlex joints find application on hydraulic and platen presses, vulcanizers, steam-heated kettles and mixers, and other similar machines. Standard sizes up to one-inch inside diameter are available, and larger sizes are in preparation.



"BRS 700 Rubber Softener in a 50:50 GR-S: Natural Rubber Blend." Rubber Laboratory Release No. 10, March, 1949. Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 20 pages. Extensive laboratory test data and formulations are given to show that BRS 700 in carbon black filled GR-S-natural rubber blends gives improved processibility, better filler dispersion, decreased viscosity, reduced nerve, excellent mechanical and aging properties, and compounding economies.

FAR EAST

INDONESIA

Postwar AVROS Report

The recent first postwar issue of Communications of the General Experiment Station of the AVROS (General Association of East Coast Sumatra Rubber Producers) includes the annual report of the director of the experiment station for the year 1940, which was found practically intact, only the list of publications that the Experiment station has issued through the years had to be made up again.

The actual report is preceded by a commemoration, in the form of brief biographies, of those members of the staff who lost their lives in the war. Of the European staff of 13 attached to the Station at the outbreak of hostilities, six died in this way.

At the head of the list is A. d'Angremond, director of the Experiment Station at the time of the invasion, a post he had held since 1928. For a time he continued his work under a Japanese director. He died June 25, 1945, in a civilian concentration camp at Si Ringo-Ringo, almost on the exact day of his birth 62 years earlier.

J. F. Schmole, planting expert, known especially for his work on selection at the Polonia Experimental Garden, died November, 1943, aged 46, in the civilian concentration camp at Medan, from a lung disease.

L. R. Van Dillen came to Java in 1920 and in 1934 joined the AVROS Experiment Station as a chemist, concentrating on the preparation of latex and rubber. Although 53 years old when the war with Japan threatened, he volunteered for military duty, was taken prisoner, and in June, 1944, when he was being transported to Singapore, went down when the ship was torpedoed.

C. G. P. Saubert, agricultural expert with the Experiment Station since 1938, met the same fate. Previously he had been taken prisoner by the Japanese for his underground activities. He was 36 years old when he died.

J. G. R. Rockland, analytical chemist, joined the station in 1934. He died in a war prisoners' camp in East Coast Sumatra at the age of 42.

J. Adriaanse, for many years with the H.A.P.M. before he became assistant at the selection gardens, Soengei Pantjoer and Ack Pantjoer, died at the age of 55 in the same concentration camp as Dr. d'Angremond, preceding the latter in death by only a few days.

The experimental gardens of the AVROS include the well-known Polonia garden, Soengei Pantjoer and Aek Pantjoer. Polonia had 145 hectares under rubber in 1940, of which about three-fourths were buddings and the rest seedlings. The tappable area of 130 hectares yielded at the rate of 1,190 kilos per hectare, which is about 1,060 pounds per acre. In 1940 many tests were in progress involving different methods of tappings, soil investigations, manuring, proving clones, etc. According to the report, the value of many of these tests was greatly diminished by the damage inflicted by severe storms and heavy rains during part of the year.

At Soengei Pantjoer, which has an area of 77.7 hectares under seedlings and buddings, artificial pollination of superior trees received special attention; 126,579 flowers were hand pollinated, but ultimately only 3,700 were successes. The fruits yielded 10,279 seeds.

The Aek Pantjoer selection garden had a rubber area of 189.5 hectares, all planted between 1936-1940. Experiments had been started in an attempt to capitalize on the transmittable variability of *Heveas* and to develop trees yielding rubbers of different qualities. To this end crosses were made in 1938 between clones of *Hevea brasiliensis* and those belonging to *Hevea spruceana* and *Hevea collina*. Legitimate seedlings belonging to the families AV163 x *Hevea spruceana*, AV 470 x *Hevea spruceana*, AV 308 x *H. spruc.*, Tjir.1 x *H. spruc.*, BR 2 x *H. spruc.*, and those of the families AV 470 x *Hevea collina*, Tjir. 1 x *H. coll.*, BR 2 x *H. coll.* were planted here. In that year it had also been the intention to cross *Hevea brasiliensis* with *Hevea guyanensis*, *Hevea confusa*, and *Hevea pauciflora*. It was expected to be able to obtain from such crosses and recrosses offspring yielding latices of very different qualities, always supposing that the hybrids did not prove to be too sterile.

Many of the hybrid seedlings already obtained at the time showed very vigorous growth, and it had been expected that they would soon be tappable.

In the chemical laboratory much attention was given to the then-new method of analyzing latex, known as determination

of the KOH number of latex, developed by H. F. Jordan, of United States Rubber Co., by which quantitative determinations could be made of the amount of acids in fresh or preserved latex. Special interest was attached to this investigation because the method was the only one known which gave any insight into the chemical changes taking place in preserved latex and hence the possibility of devising suitable precautionary measures. AVROS chemists found that a high KOH number could be caused either by tardy or inadequate preservation, usually the latter; results of tests running at the time prompted the advice to increase to 1% the ammonia content in latex intended for shipment. It was further found that the use of 0.2% of ammonia plus 0.2% Santobrite was not less effective than 1% ammonia, and a good deal cheaper.

The arrival of a latex clarifier led to another series of experiments which showed that clarified latex creams better than ordinary latex, while the centrifuge used for concentrating latex does not clog so rapidly. It was also found that clarifying yellow latex led to an improvement in the color.

Production and Exports

Estate rubber production in Indonesia has been increasing steadily. Output in January, 1948, was only 3,685 long tons, but by October the figure had risen to 11,303 long tons, bringing the total for the first 10 months to 76,308 long tons. Preliminary figures indicate that of 405 estates reporting in September, 1948, 377 were operable, and 337 were actually producing; the area of reporting estates was 720,714 acres, of which 351,870 acres were being tapped.

Legal exports from Dutch areas for the first nine months of 1948 totaled 212,206 long tons, of which 78,076 tons were estate and the rest native rubber. The United States took 76,124 tons; United Kingdom, 9,201 tons; Netherlands, 37,905 tons; other European countries, 12,723 tons; Malaya 60,991 tons; Japan, 10,720 tons; to other countries, 4,497 tons.

Imports into Malaya from Indonesia in the first nine months of 1948 amounted to 177,048 long tons, which less the 60,991 tons exported from Dutch areas to Malaya, as noted above, leaves 116,057 tons, which may be assumed to represent rubber shipped from Republican areas and smuggled from Dutch areas. Total exports from Indonesia for the nine-month period may thus be put at 328,263 long tons.

Later reports show that exports from Dutch areas in October came to 23,591 long tons, a considerable decrease from the postwar record of 42,015 long tons shipped in September, but substantially higher than the 16,842 long tons reported for August. It seems that the reason for this violent fluctuation was the September war scare, plus the news that the government was to decrease inducement payments in non-Dutch currency and to raise export tariffs.

The export duty on rubber for the last quarter of 1948 was increased by 1.8 guilder cents to 5.2 guilder cents per kilogram.

MALAYA

Rubber Companies to Grow Cocoa

The possibility of a cocoa famine resulting from the devastation caused among cocoa trees in West Africa—the major source of supply—by a disease for which no remedy has so far been found, led the Colonial Secretary to send Prof. E. E. Cheeseman, a recognized authority on cocoa, to Malaya, Sarawak, and North Borneo in 1947 to investigate the possibilities of cocoa growing in these territories. He reported that the prospects for cocoa growing in Malaya appeared sufficiently good to warrant expenditure on serious attempts to establish the crop on a commercial scale. Rubber planters were invited to begin trials with cocoa, and an encouraging number has already started experiments or plan to do so. It is recognized that cocoa, if grown on suitable soil, might prove a valuable secondary crop for rubber producers.

Record Production in 1948

Malayan rubber production for 1948 reached the record total of 696,978 long tons, against 646,400 long tons in 1947. Of the 1948 total, 328,376 tons came from European estates, 74,531 tons from Asiatic estates, and an estimated 285,364 tons from small holders. Additional production on Singapore Island is estimated

at 1,212 tons, against 1,133 tons in 1947. Latex output (dry rubber content) is given as 45,884 tons in 1948, against 32,159 tons in 1947. Malaya produced 46% of the 1948 world output of natural rubber estimated at 1,520,000 tons.

The Rubber Study Group issued figures recently showing that the average yield of rubber per tapped acre on estates in Malaya during 1948 was 564 pounds, compared with the 1947 figure of 569 pounds per acre. The average yield per tapped acre in 1948 on estates in Indonesia was much higher, having been 786 pounds per acre. Sumatra ranked as top producer here, with an average of 949 pounds per acre; East Indonesia is credited with 722 pounds per acre, Java, 646 pounds, and Borneo, 489 pounds per acre.

Protection against Banditry Sought

Acts of violence, especially by Johore terrorist gangs, continue to be reported in the papers with alarming frequency, and the danger in the outlying districts at least appeared to be as great as ever—greater some planters claimed. According to the *Malay Mail*, the Incorporation Society of Malayan Rubber Planters requested increased security measures by the government for planters on isolated estates, following a resolution by the Negri Sembilan branch which claimed that an increasing number of planters was leaving the industry. The resolution warned that the industry would soon face an acute shortage of trained Europeans, and Malaya would find it difficult to maintain her present position as chief dollar earning country in the British Empire.

CEYLON

Future of Ceylon Rubber

The future of Ceylon rubber has been a frequent topic of discussion lately, and leading personalities seemed to be agreed on at least one thing, that the only salvation for the rubber industry here is to reduce production costs.

F. D. Ascoli, managing director of Dunlop Rubber Plantations, Ltd., on his way to Singapore to study economic and political conditions there, passed through Colombo and stated in an interview that wholesale replanting of rubber estates with high-yielding strains was the remedy for the Ceylon rubber industry. At present Ceylon rubber was the most costly to produce, chiefly because of poor yields, and it was a harmful policy to try —as Ceylon was doing—to maintain artificially high prices to save inefficient estates. Such a policy would be an incentive for manufacturers of rubber goods to turn to lower priced synthetic rubber and so perhaps kill the natural rubber industry.

The outlook for rubber in the next few years, Mr. Ascoli further said, was anything but pleasant; already production exceeded consumption by about 100,000 tons, and with the Dutch Indies and French Indo-China also coming into full production, there would be a surplus of about 500,000 tons of rubber. The position, he added, was gloomy, but neither depressing nor desperate. On the subject of restriction, Mr. Ascoli stated that owing to disturbed political conditions in most rubber-producing countries, no basis existed on which a control scheme like that operating in prewar days could be introduced. He also pointed out that production cost of synthetic rubber did not differ much from that of natural rubber and that American rubber manufacturers seemed to prefer the former. Synthetic rubber would be a very keen competitor in the future; therefore all rubber growers would have to produce cheaper rubber if they wanted to exist.

The Prime Minister of Ceylon, in the course of a speech at the first anniversary celebrations of Ceylon's independence, referred to the rubber industry and expressed himself similarly. The United States, the largest consumer of rubber, he said, was still using large quantities of synthetic rubber, and science might further its use. Meanwhile, overproduction menaced the natural rubber industry, and unless production costs could be reduced, Ceylon's rubber industry might die a slow death.

E. W. Whitelaw, one of the two members of the Rubber Commission which in 1947 reported on the rubber situation in Ceylon and made recommendations for rehabilitating the industry here was somewhat more optimistic, at least about the threat of overproduction and of synthetic rubber. But he made it clear that he did not think it likely that the price of natural rubber would go above 1s. per pound; many Malayan estates could make a fair profit at this price, he added, but Ceylon estates with their high

costs of production would not be able to make ends meet. There was thus nothing for Ceylon growers to do but cut production costs; it was useless to wait for prices to go up.

The Ceylon Government is said to be consulting with Vance Orr, of The General Tire & Rubber Co., who recently arrived in Ceylon, on proposals for the establishment of a tire factory here.

Declining Price Remedy Sought

The drop in the price of rubber in Ceylon to about 53 rupee cents a pound is causing grave concern since it is feared that if this rate continues much longer, at least 50% of the estates here would have to close down, forcing about 100,000 estate workers into unemployment. The government is considering introducing a floor price or a subsidy. The Rubber Commissioner, S. Casinathan, has suggested a board to fix a fair price for rubber each month based on the position of the world rubber market. Shippers would be permitted to buy on the government's behalf, and this rubber would be graded, baled, and stored. Shippers would invite best offers from abroad and would be allowed to send out the rubber on payment of the full value of the shipment. Mr. Casinathan believes that in this way Ceylon would be in a position to attract large orders which have hitherto gone to Malaya, and continued large orders would insure a steady market; while the producer would get an increase in price.

Rubber brokers and shippers in Ceylon, however, believe that such a scheme would be impracticable especially as Ceylon produces only about 10 to 12% of world rubber output; they also fear that it might mean interference with free trade; therefore they prefer a subsidy of 10 rupee cents a pound for rubber.

Ceylon Rubber Exports in 1948

Ceylon rubber exports in 1948 totaled 205,803,025 pounds, value 141,618,650 rupees, in addition to 1,484,237 pounds of latex, value 1,798,835 rupees. America took 110,753,871 pounds; next came the United Kingdom, with 46,689,245 pounds; Germany was third, with 13,285,859 pounds. Well over half the latex exports went to the United Kingdom.

About the Russian offer made toward the end of last year, it is learned that Russia actually wanted to buy Ceylon's rubber output at the current world price, but the Ceylon Government rejected the offer because it was uneconomic for Ceylon to be tied to a single country in selling rubber. The government requested Russia to bid for Ceylon rubber in the open market, but apparently Russia made no actual firm offer.

INDIA

At a meeting of rubber technicians and representatives of firms connected with the industry held in Calcutta last September, the Indian Section of the Institution of the Rubber Industry was formed. This section will take the place of the Indian Advisory Committee set up in 1946 to coordinate the Institution's activities in India. Presiding over the meeting was R. F. Bennett, and Prof. B. C. Guha was the chief guest.

Speaking at the meeting Professor Guha pointed out that consumption of rubber was bound to go up in India as the standard of living in India improved, and increased production of rubber as well as intensive research work were necessary to permit the industry to expand as it should. He felt that individual factories as well as the government should be approached to establish a National Institute of Rubber Technology.

Mr. Bennett then addressed the assemblage, in his turn stressing the importance of research and trained personnel for the development of India's rubber industry; he pointed to the valuable contributions which the IRI had made in England and could make in India also. He added that India had the advantage of being able to produce enough rubber to cover 80% of her requirements, as well as a number of basic raw materials for the industry. As the basic chemical industries developed, it would be possible to produce certain essential chemicals also in India.

C. O. Tattersall, of the Imperial Chemical Industries (India), Ltd., Calcutta, revealed that a full-scale laboratory plant for rubber would begin functioning shortly. It is intended to give trainees from different firms a course of instruction in manufacturing and investigation of various technological problems.

EUROPE

NORWAY

Production of rubber goods in Norway has developed considerably in recent years; in 1948 it was 30% greater than in 1947 and much greater than before the war; productive capacity has meanwhile increased 50%. As a result, Norwegian rubber manufacturers can meet the greater part of the home demand for most rubber articles except tires, of which about 50% must still be imported. Despite increased production, Norway still depends on foreign sources to meet all her needs, and reduced imports last year led to marked shortages in tires and certain other goods not yet produced on an adequate scale in the country.

Imports of tires for trucks, buses, and automobiles had declined from 1,231 tons in 1947 and 1,187 tons in 1946 to 613 tons in 1948; while imports of tubes fell from 116 tons in 1947 and 159 tons in 1946 to 37 tons in 1948. It is expected that imports of truck and bus tires and also of certain basic raw materials will show a substantial increase for 1949.

The United Kingdom, Norway's chief source of rubber imports, in 1948 supplied such goods to a value of 5,400,000 Norwegian crowns;[1] imports from France at the same time were valued at 2,500,000 crowns, and from the United States at 1,800,000 crowns.

[1] Norwegian crown equals U. S. $0.2016

HOLLAND

The rapidly reviving German tire industry seems to be causing some concern in Holland, which has not been lessened by reports of the cancellation of a relatively large German order for Dutch tires, it is gathered from a newsletter by the Amsterdam correspondent of *The India Rubber Journal*. According to that writer, saturation in tire consumption has been reached in Holland, even in bicycle tires, and the export campaign has to reckon with sharply growing competition from numerous countries. He adds that two companies (apparently specializing in cycle tires) recently let some employes go.

The N.V. Chemische Industrie Magenta, Delft, which has been working on methacrylate resins in the form of transparent and opaque sheets and rods, is said to be starting a new factory for production of these materials on a large scale.

The Netherlands, which in 1947 imported rayon tire cord from the United States, is understood to have begun sending rayon to Belgium, where it is spun into cords which will be returned for use in tires.

The Netherlands Ministry of Economic Affairs has reportedly removed control on tires for automobiles and motor cycles since local production supplemented by imports is now sufficient to cover home needs.

CZECHOSLOVAKIA

Since the war's end, many changes have occurred in Czechoslovakia. The Bata corporation has been nationalized and is now known as the Svit National Corp., and the town of Zlin, known all over the world as Bata headquarters, is at present Gottwaldov. A state monopoly "Exico" has been created for the import and export of leather and rubber goods. A new five-year plan was started at the beginning of the current year, and new production quotas were fixed, according to which the Svit corporation is to increase output so that by 1953 it will be 145% of the value of the 1948 quota. Exico announced that January, 1949, quotas for rubber footwear were filled 103%, cycle tires 104%, but automobile tires 93.6% and motor cycle tires only 87.4%. The Svit factories, however, will introduce the Russian Stakhanovite system whereby extra-fast workers are placed as "pace makers" in different sections where speeding up is deemed necessary.

Under the five-year plan, too, the new Puchov tire factory of the nationalized Matador company will begin to operate. This factory is said to be a model plant built after the latest American design with all production concentrated on one large floor to permit total mechanization. The output of the Puchov works is expected to increase local tire production 64% within the next five years so that domestic needs would be well covered, probably leaving the greater part of the Puchov product for export.

Czechoslovakia's postwar trade in rubber goods has been steadily growing; in 1948 the value of rubber goods at 830,000,000 Czech crowns represented an increase of 70% over that of 1947. Among the customers for her rubber products (chiefly footwear, tires, belting, hose and rubberized fabric) in 1948 were Great Britain and several British countries, the Benelux countries, Sweden, U.S.S.R., Switzerland, Austria, Hungary, Iran, and Venezuela.

FRANCE

France imported 89,649 metric tons of rubber in 1948, against 75,755 tons in 1947. Of this, 30,424 tons came from Indo-China, against 39,542 tons in 1947; 46,041 tons from Malaya, against 22,520 tons, 6,766 tons from Indonesia, against 250 tons; 1,293 tons from the United States, against 4,148 tons; and 5,125 tons from other sources, against 9,295 tons.

The French Rubber Institute had arranged a symposium on latex and oxidizability held in Paris, November 23 and 24. Several members of the Rubber Stichting, Delft, Holland, including Professor Van Rossem, and Dr. Houwink; Drs. Gee, Newton, Long, and Blow, of the British Rubber Producers Research Association were present.

On November 25, 1948, Prof. v. Rossem, Dr. Houwink, Dr. Gee, and Messrs. Le Bras and de Padirac, of the French Rubber Institute, met at a research conference to which Dr. Honig, head of the Rubber Research Institute in Netherlands India, had been invited. Dr. Newton acted as secretary, and Drs. Long and Blow were also present. The matters discussed included the latest results obtained, the situation created by the development of low temperature GR-S, and the program of research for 1949. There was a special discussion of methods of improving the impermeability to gases of natural rubber.

EUROPEAN NOTES

According to recent reports, a new, puncture-proof inner tube has been invented in Spain. This tube consists of six independent cells joined to form a complete tube. A single valve provides air to the cells through six separate ducts so that if one of the cells is punctured or damaged by a bullet, the tube still remains servicable. The principle is applicable to all kinds of pneumatic tires and also to inflatable rubber dinghies as used by airmen or shipwrecked sailors.

The Russians are reported to have offered Ceylon a barter arrangement by which Russia would supply wheat, beet sugar, German-manufactured cement, and tea chests in exchange for rubber, tea, coconut oil and spices from Ceylon.

Construction on Poland's first butanol and acetone plant has just been completed. The plant, designed by Polish engineers and equipped with Polish-made materiel, was scheduled to begin production in September, 1948.

Editor's Book Table

BOOK REVIEWS

"Engineering with Rubber." Edited by Walter E. Burton. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Cloth, 6 by 9 inches, 496 pages. Price $6.50.

Written in collaboration with engineers and research men of The B. F. Goodrich Co., this volume presents a practical and comprehensive picture of the engineering, design, and maintenance principles involved in the use of rubber in industry. A background of information is given on the compounding and methods of manufacture of the hundreds of rubber products discussed, but the major portion of the text describes existing engineering uses of rubber with information on desirability, relative advantages compared to other materials, and extensive data on properties, specifications, dimensions, etc.

The first two chapters cover types and properties of rubber, but succeeding chapters are devoted to individual types of rubber products, as follows: adhesives; latex products; V-belts and sheaves; transmission, conveyer, and elevator belting; extruded rubber; rubber mountings; hard rubber; hose; rubber in hydraulic equipment; lathe-cut rubber; linings; molded rubber; packing and sheet rubber; printing materials; rubber-covered rolls; sponge rubber; rubber thread and tape; miscellaneous rubber products; and vinyl chloride polymers. A chapter on case histories of industrial problems solved by use of rubber concludes the book, and a comprehensive subject index is appended.

"Handbook of Chemistry and Physics." Thirty-First Edition. Charles D. Hodgman, Editor-in-Chief. Chemical Rubber Publishing Co., 2310 Superior Ave., Cleveland 14, O. Cloth, 5 by 7½ inches, 2752 pages. Price $6.

This new edition of the standard handbook shows continued growth; some 50 pages of new and expanded material have been added. The five-section format has been retained. The first section, mathematical tables, comprises 299 pages and includes new tables on logarithms of decimal fractions and squares of sines and cosines. The second section, properties and constants of elements and chemical compounds, in 1055 pages, includes new tables of electronic configuration of elements, and isotropic masses. The 412-page third section, on general chemical tables, has been modernized throughout. Physics data, the fourth section comprising 585 pages, includes a new 151-page table on wave lengths of principal lines in the emission spectra of elements. The concluding 347-page section, on quantities and units, shows no new tables, but has been extensively revised and brought up to date.

"The New Industrial Relations." Louis M. Hacker, Benjamin M. Selekman, Ralph T. Seward, William J. Dickson, T. V. Smith. Cornell University Press, Ithaca, N. Y. 1948. Cloth, 5½ by 8¾ inches. 150 pages. Price $2.00.

The contents of this book were prepared from a series of lectures given at the New York State School of Industrial and Labor Relations at Cornell University in 1948 and made possible by a grant from Edward L. Bernays. Three of the chapters were prepared by university professors and two by industry workers in the field. The material is very pertinent to present-day conditions and should amply repay management, industrial relations, and labor executives for the time required to read it.

The first chapter by Louis M. Hacker, of Columbia, is entitled, "Collective Bargaining and American Institutions." Economic and political trends in the United States are reviewed with special reference to the establishment of Big Business, Big Labor, and now the Big State. Course of action for the first two are recommended in order that by collaboration and greater understanding of their rights and responsibilities "we can avoid the Big State overpowering all of us."

Benjamin M. Selekman, of Harvard, discusses "Some Implications and Problems of Collective Bargaining" in the second chapter and defines eight "structures of collective relations" in management-labor relations that may be differentiated among the patterns that are evolving. The point is made that in few other areas, i.e., industrial relations, can industry and the university collaborate with such promising results.

Ralph T. Seward, impartial arbitrator for U. S. Steel and the United Steelworkers, writes on "Basic Elements in Labor Relations Practice." Three factors among these basic elements, the challenge to the authority of management and supervision,

the increased expression given to the elements of conflict in labor relations problems, and the necessity of solving problems within the framework of principles established by management-labor agreements, are defined and discussed.

William J. Dickson, of Western Electric Co., Inc., divides his chapter entitled, "An Approach to the Human Factor in Work Relations," into two parts. The first covers the problem of the adjustment of the individual to conditions of present-day society, and the second reviews the personnel counseling practiced by his company as a specific approach to better labor relations.

The final chapter by T. V. Smith, of the University of Chicago, is on "Industrial Relations and Modern Society," and this writer states that skill, imagination, and magnanimity are three essentials to good labor relations and all other human relations. His concluding discussion of Communism as the available alternative is most interesting.

NEW PUBLICATIONS

"Huber News." April, 1949. J. M. Huber Corp., 342 Madison Ave., New York 17, N. Y. 16 pages. While featuring a story on oil-well drilling, this issue of the company's house organ also contains a story on the recent changes in operational set-up of the Huber laboratories, including top personnel and functions of the printing ink, carbon black and rubber, and clay division laboratories.

Publications of United States Rubber Co., Rockefeller Center, New York 20, N. Y. **"Hydron Absorptive Form Lining."** 12 pages. This manual treats of the use of Hydron flexible, re-usable rubber form strips in the construction of smooth, durable concrete surfaces. Illustrated descriptions cover methods of installation, relative costs, applications, and specifications.

"E-S-E-N, Retarder or Antiscorch for Processing Safety." Compounding Research Report No. 10. Naugatuck Chemical Division. 8 pages. Properties of E-S-E-N are given together with formulations and laboratory data on its use in black and non-black natural rubber compounds and in GR-S and GR-I. The material is shown to be a general antiscorch for use in all stocks with all accelerators and to be a powerful retarder of vulcanization at processing temperatures.

Publications of E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. **"Compounding and Processing of 'Low Temperature' GR-S Tire Tread Stocks."** BL-231, April 15, 1949. 8 pages. A practical formulation for "cold rubber" tire treads compounded with HAF black is presented, together with two mixing procedures and test data showing the superior wear of this rubber compared with regular GR-S. The effectiveness of RPA No. 3 as a chemical plasticizer in "cold rubber" is also shown. **"Neoprene Crepe Soles."** 8 pages. The advantages of neoprene crepe soles are discussed in this booklet, and photographs and data compare neoprene and rubber crepe soles with respect to spreading, oil resistance, grit pick-up, abrasive wear, uniformity, and color.

"Eleventh Report of the 'Rubber Foundation' Covering the Year 1947." Rubber Foundation, Delft, Holland. 62 pages. This report gives information on the Foundation's 1947 activities, including organization, meetings, staff activities, personnel, and lecture work. Detailed descriptions of the activities of the research, development, and patent departments also are included.

Publications of Indoil Chemical Co., 910 S. Michigan Ave., Chicago 80, Ill. **"Indonex Plasticizers in Hose and Cover Compounds."** Circular No. 13-32, February 1, 1949. 12 pages. Formulations and test data are offered on use of Indonex as a partial replacement for ester plasticizer in a Hycar hose tube compound; further results appear, supplementing Circular 13-3, on Indonex in a neoprene hose tube and cover compound; and new results on Indonex in a steam hose tube and cover compounding using natural rubber with acid, neutral, and alkali reclaim. **"Indonex Plasticizers in Low Temperature GR-S Compounds."** Circular No. 13-33, April 15, 1949. 4 pages. Formulations and test data are given for a series of six GR-S X-485 compounds using various carbon blacks and different amounts of Indonex. Indonex is shown to be especially suited to the formulation of mechanical goods compounds with low temperature GR-S and high black loadings.

"**Maglite—M,** a Magnesium Oxide for Use with Neoprene." Marine Magnesium Products Corp., South San Francisco, Calif. 24 pages. This booklet by Robert D. Abbott, consultant, is the first of a series resulting from an extensive program of research on neoprene compounding being carried on by Marine Magnesium. Data on surface activity, anti-scorch, prevulcanization storage, curing, and bin aging characteristics are presented. It is also pointed out that Maglite—M is shipped in Polythene packages for maximum protection against the absorption of water vapor and carbon dioxide and for ease of handling during compounding since the magnesium oxide may be thus introduced into the Banbury without removing it from the package.

"**The Miracle of America**—As Discovered by One American Family." The Advertising Council, 25 W. 45th St., New York 19, N. Y. The Advertising Council, a non-profit, non-political, non-partisan organization formed to utilize advertising in the public service, was formed shortly after Pearl Harbor and helped plan and prepare, without charge, advertising for War Bond, Scrap Salvage, and other such campaigns during the war years. Today the Council is conducting many information campaigns, of which this booklet is a part of one to explain the American economic system to all. It is obtainable from the Council at the above address either singly or in quantity lots for distribution by company management to its employes.

"**Program for Professional Engineering Education in Plastics.**" The Society of Plastics Engineers, Inc., Athens, O. 12 pages. Prepared by the SPE Educational Committee, this report discusses the objectives of undergraduate and graduate courses in plastics engineering and gives descriptions of recommended courses.

Publications of Eastern Regional Research Laboratory, United States Department of Agriculture, Philadelphia 18, Pa. "**Lactic Acid—Versatile Intermediate for the Chemical Industry.**" C. H. Fisher and E. M. Filachione. AIC-178, May, 1948. 24 pages. Lactic acid is shown to be a suitable raw material in the manufacture of various resins, solvents, plasticizers, and other important industrial products. "**Improved Preparation of Acrylic Rubber.** Curing Methods and Properties of the Vulcanizates." W. C. Mast and C. H. Fisher. AIC-206, December, 1948. 20 pages. An improved method, "granulation polymerization," for polymerizing monomers and preparing acrylic elastomers has been developed and is described. Previously reported methods for vulcanizing ethyl polyacrylate and other simple polyacrylic esters are reviewed, and new methods described. The preparation and vulcanization of two ethyl acrylate-methyl vinyl ketone copolymers are described.

"**Approved Maintenance Methods for Rubber Floors.**" A.I.A. File No. 23-C. The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York 22, N. Y. 8 pages. The RMA's flooring division herewith publishes Approved List No. 11 giving the brand names and names and addresses of manufacturers of cleaners and polishes tested and approved for use on rubber flooring installations. The pamphlet also contains the Association's approved maintenance methods for rubber floors, and suggestions on the proper use of casters and glides on such flooring.

Publications of British Rubber Producers' Research Association, 48 Tewin Rd., Welwyn Garden City, Herts., England. No. 105. "**The Hydrodynamics of Non-Newtonian Fluids. II.**" R. S. Rivlin. 4 pages. The general hydrodynamic theory of visco-inelastic, incompressible, non-Newtonian fluids previously developed is applied to flow of such a liquid through a tube of circular cross-section.

No. 108. "**Large Elastic Deformations of Isotropic Materials. V.** The Problem of Flexure." R. S. Rivlin. 12 pages. The problem of cylindrical flexure of a cuboid of highly elastic, incompressible material is considered and the method evolved in Part IV of this series employed to calculate the surface tractions needed to maintain the state of flexure. Conditions for tractions over both curved surfaces are discussed, and the stress components are found for the case of a general stored-energy function.

"**The New Look in Blue Bird 100% Natural Rubber Balloons.**" National Latex Products Co., Ashland, O. 20 pages. This catalog describes and illustrates the company's balloons and novelties. A history of the firm and photographs of its plants and management personnel are also included.

"Hercules Ethyl Cellulose—Properties and Uses." Hercules Powder Co., Wilmington, Del. 60 pages. General properties of ethyl cellulose appear as well as information on formulation and uses in specific applications, including adhesives, coated fabrics, plastics, pigment grinding bases, hot melts, and others.

"Information and Technical Data on Seiberling Truck and Bus Tires." Seiberling Rubber Co., Akron 9, O. 76 pages. This booklet offers complete descriptive and tabular data on the company's truck tires, including sizes, loads, and inflations; tire changeovers; a plan for truck-bus tire application analysis for fleet operations; load distribution between dual tires; rim information; technical data on disk wheels and valves; dimensional data on flaps; Seiberling batteries; and a section on tips for tire service men.

"Seiberling Merchandise Catalog, 1949." 50 pages. Designed as both a wholesale listing for dealer purchasing and as a retail selling catalog, this illustrated booklet covers automobile and truck accessories, lawn and garden supplies, and wheel goods and toys sold by Seiberling through its products department.

"How to Use Tite-Fit Burlap Tubing." Bemis Bro. Bag Co., Brooklyn, N. Y. 22 pages. This illustrated pocket-size booklet offers information on the selection and use of burlap tubing for wrapping unwieldy items, including rubber hose and tires. Detailed instructions are given on wrapping heavy items without lifting them, and how to stencil, label, tie, and tag wrapped packages.

"Butex in GR-I Compounds of Graduated Hardness." Report No. 11, April 11, 1949. Midwest Rubber Reclaiming Co., East St. Louis, Ill. 4 pages. Formulations and test data show that Butex, a Butyl inner tube reclaim, may be used with GR-I to give compounds of graduated hardness complying with the requirements of Type R (non-oil resistant) compounds under ASTM D735-49.

Publications of the United States Bureau of Agricultural and Industrial Chemistry, Washington, D. C. AIC-205, September, 1948. **"The Amine Vulcanization of Ethyl Polyacrylate."** J. E. Hansen, W. E. Palm, T. J. Dietz. 6 pages. AIC-206, December, 1948. **"Improved Preparation of Acrylic Rubber.** Curing Methods and Properties of the Vulcanizates." W. C. Mast, C. H. Fisher. 17 pages **"Industrial Uses of Radioactive Materials.** A Selected Bibliography." Arthur D. Little, Inc., Cambridge 42, Mass. 14 pages. **"Taber Plastic Fabricating Machines."** Taber Instrument Corp., 111-IRW Goundry St., North Tonawanda, N. Y. 6 pages. **"Polystyrene Molding Materials."** British Standard 1493. British Standards Institute, London, S.W.1, England. 14 pages. **"B. F. Goodrich Presents Its 1948 Annual Report to the Men and Women of All Divisions."** B. F. Goodrich Co., Akron, O. 8 pages.

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Market Reviews

CRUDE RUBBER

Commodity Exchange

WEEK-END CLOSING PRICES

	Mar. 26	Apr. 30	May 7	May 14	May 21	May 28
No. 1 Contract:						
July	18.50	18.18	18.18	18.12	17.75	16.75
Sept.	18.33	17.95	18.08	18.05	17.65	16.61
Nov.	18.18	17.78	17.96	17.92	17.25	16.54
Jan.	18.05	17.61	17.81	17.76	17.36	16.45
Mar.	17.95	17.45	17.65	17.60	17.20	16.35
May	17.85	17.35	17.55	17.50	17.10	16.25
Total Weekly Sales, tons	1,700	4,120	3,380	1,640	2,740	5,760

INCREASING uneasiness and weakness in foreign and physical markets were reflected by falling rubber futures prices on the Commodity Exchange last month. After a dull period during the first two weeks of May, activity increased as brokers and dealers entered the market with heavy liquidation. There appeared to be no one major cause for the price decline, but many factors influenced the market.

Some of these depressing factors were: (1) the standstill in trading in the physical market and the large supply of crude rubber piled up in port warehouses; (2) pessimistic forecasts for a large upswing in rubber buying within the near future owing to lagging tire sales and reports of imminent tire price reductions; (3) the continuing high volume of crude rubber production and increasing stocks in producing areas, coupled with reports of decreased purchases by Russia; (4) an increase in hedging and sales offerings by brokers unable to dispose of physical stocks; (5) reports of a devaluation in the English pound within the near future; (6) reports of continued weakness in foreign markets, with further price declines noted in Ceylon and other markets; and (7) increasing pessimism over crude rubber future prospects with the further promotion of cold synthetic rubber.

In the No. 1 contract, July futures opened the month at 18.25¢, the high for May, fluctuated between 18.05¢ and 18.21¢ for the next two weeks, then fell off to close the month at a low of 16.52¢. Other futures showed similar declines; while May and June futures sold at discounts under the July level of as much as 0.40¢. Most activity in hedging was concentrated in September futures, which began the month at 18.10¢, reached a high of 18.15¢ on May 11, fell to a low of 16.87¢ on May 31, and closed the month at 16.37¢.

Total sales for the month were 13,520 tons. There were no sales in the old Standard Contract which terminated on May 26.

New York Outside Market

WEEK-END CLOSING PRICES

	Mar. 26	Apr. 30	May 7	May 14	May 21	May 28
No. 1 R.S.S.:						
May-June	18.75	18.38	18.38	18.38	17.88	16.75
July-Sept.	18.63	18.25	18.25	18.25	17.88	16.75
Oct.-Dec.	18.50	18.13	18.13	18.13	17.75	16.75
No. 3 R.S.S.	17.25	16.75	16.63	16.63	16.00	15.38
No. 2 Brown	15.25	15.00	15.13	15.13	14.88	15.00
Flat Bark	12.13	12.25	12.38	12.50	12.25	12.00

RUBBER trading in the New York Outside Market during May was virtually at a standstill as prices fell sharply to the lowest levels since September, 1947.

With large stocks on hand, prospects of continued high receipts of crude rubber, and no change in consumers' hand-to-mouth purchasing policies, no increase in trading was expected until government stockpile purchasing begins. A decision on the stockpile appropriation to June 30 was expected shortly, but final approval on the 1950 stockpiling bill was not expected before June 15, at least.

The market decline brought the spot price for No. 1 Ribbed Smoked Sheets down to the 16.50¢ level, 2.00¢ below the price for GR-S, but no increase in demand was apparent, even at this price. Prospects for increased purchasing by rubber companies were seen to depend on tire sales, and there were little signs of tire sale improvement within the immediate future.

From the monthly high of 18.50¢ on May 2, the spot price for No. 1 sheets hovered near 18.38¢ for two weeks, then fell steadily, reaching 17.13¢ on May 24 and a low of 16.50¢ on May 31. No. 3 sheets fell from a high of 16.88¢ to a low of 14.88¢; No. 2 Brown went from a high of 15.13¢ to a low of 14.50¢; and Flat Bark prices, while showing the least unsteadiness, dropped from 12.50¢ to 11.88¢.

Latices

THE increase in *Hevea* latex is apparently not resulting from replacement of GR-S latex to an appreciable extent as yet, according to Arthur Nolan, Latex Distributors, Inc., writing in Lockwood's May *Rubber Report.* The recent decline in price of *Hevea* latex to 25.5-28.5¢ a pound, the lowest level since well before the war, may cause some replacement of GR-S latex in certain lines. With stocks coming more into balance by increased consumption and lower production and shipments, there may be some stabilization of *Hevea* latex prices at current levels.

Mr. Nolan gives estimated March figures for *Hevea* latex imports of 2,809 long tons, dry weight; consumption, 3,399 long tons; and month-end stocks, 9,590 long tons. Preliminary totals for the first quarter of 1949 for *Hevea* latex, based on these estimates are: imports, 6,100 long tons; consumption, 8,631 long tons.

Estimated March production of GR-S latex of 1,679 long tons, dry weight, gives a three-month total of 4,435 long tons. GR-S latex bulk prices showed no change from the previous level of 18.5-20.25¢ per pound.

RECLAIMED RUBBER

THE expected improvement in reclaimed rubber sales took place during May, with sales up approximately 13% from the low April level. Optimism over this upswing was tempered by the declining natural rubber market which was expected to provide further competition between crude and reclaimed rubber. Production and exports of reclaim continued at satisfactory levels last month.

Final February and preliminary March statistics on the domestic reclaimed rubber industry are now available. In February, production totaled 18,270 long tons; consumption, 17,712 long tons; exports, 1,012 long tons; and month-end stocks, 32,738 long tons. Preliminary figures for March give a production of 19,972 long tons; consumption, 19,342 long tons; and month-end stocks, 33,534 long tons. Estimates for March exports are not as yet available.

No changes in reclaimed rubber prices occurred during May, and current prices follow:

Reclaimed Rubber Prices

	Sp. Gr.	¢ per Lb.
Whole tire	1.18-1.20	8.5 / 9
Peel	1.18-1.20	8.5 / 9.5
Inner tube		
Black	1.20-1.22	12.75/13.75
Red	1.20-1.22	14 /14.5
GR-S	1.18-1.20	9.5 /10
Butyl	1.16-1.18	8.5 / 9
Shoe	1.50-1.52	8.25/ 8.75

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

SCRAP RUBBER

DOMESTIC trading in scrap rubber continued on the slow side during May. Some reclaimers were reported to be practically out of the market; while others were taking only small shipments of tires. There was no volume demand on the domestic front, although it was said that good all-natural peelings found a ready market. Some interest was also noted in red passenger tubes, and a slightly improved demand was reported in truck tires for recapping.

In general it was said that only exports were holding up the scrap rubber market. A heavier export business was anticipated as a result of the recent allotment of $400,000 by ECA for the shipment of scrap rubber to Bizonia. Direct negotiations will be made between domestic exporters and German purchasers, but the allocation does not include money for tires, being only for mixed tubes, puncture-proof tubes, factory waste, etc.

Movement of scrap tires was particularly slow. Only limited demand was apparent, and there were recurrent reports that prices of mixed auto tires will be lowered about $1 per ton on or about June 1.

Following are dealers' selling prices for scrap rubber, in carload lots, delivered to mills at points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$12.50	$13.50
Peelings, No. 1	52.25	52.25
3	30.25	30.25
	(¢ per Lb.)	
Black inner tubes	4.00	4.00
Red passenger tubes	7.50	7.50

RAYON

IN A move that surprised the entire rayon industry, American Viscose Corp. announced reductions in prices of rayon yarns and fabrics, including tire yarns and fabrics, on May 11. Tire yarn prices were

reduced by 2¢ a pound; while tire fabric prices were cut 4¢ a pound. In view of the tight supply condition of rayon tire yarn, producers were taken back by the reduction which, according to a company official, was made to "adjust to general business conditions throughout the country." Some trade observers expressed the opinion that the price reduction was made to induce tire manufacturers to increase their consumption of rayon in preference to cotton yarns and fabrics.

A similar reduction in rayon tire yarn prices was made shortly thereafter by North American Rayon Corp. Other large producers of rayon tire cord were studying the market picture and were expected to make similar price reductions within a very short time. While not reducing tire yarn prices, Industrial Rayon Corp., on May 25, announced that it will now pay the lowest published freight rate to all points east of the Mississippi. Current prices for rayon tire yarns and fabrics are shown in the following listing:

Rayon Fabrics

Tire Yarns			
1100/480	$0.53	/	$0.57
1100/490	.55		
1150/490	.55		
1650/720	.54	/	.56
1650/980	.54		
1900/980	.54		
2200/960	.53		
2200/980	.53		
4400/2934	.55	/	.56
Tire Fabrics:			
1100/490/2	.67		
1650/980/2	.645	/	.66
2200/980/2	.63		

COTTON AND FABRICS

New York Cotton Exchange
Week-End Closing Prices

	Mar. 26	Apr. 30	May 7	May 14	May 21	May 28
Futures						
July	31.13	32.45	32.69	32.62	32.57	32.42
Oct.	28.30	29.16	29.13	29.00	29.12	28.68
Dec.	28.07	28.94	28.94	28.79	28.91	28.46
Mar.	27.91	28.85	28.85	28.71	28.78	28.38
May	27.67	28.66	28.67	28.54	28.59	28.22
July	26.73	27.89	27.84	27.69	27.75	27.46

PRICES moved irregularly downward on the New York Cotton Exchange during May, in a month characterized by dull and featureless trading. The market was relatively firm during the first two weeks of the month, then slumped in the face of increased liquidation by dealers and speculators.

Bearish factors affecting the market were: (1) continued weakness in the domestic cloth markets keeping mills out of the cotton market; (2) the increasing slump in domestic cotton consumption in the face of the coming slow summer season; (3) the intention of both mills and export interests to wait for cheaper new crop cotton; (4) the prospective large size of the coming crop; (5) the continued lack of export covering which had been counted on to firm the market during the traditional slow season; and (6) the expected lowering of parity to approximately 30.38¢ a pound.

The 15/16-inch middling spot price began the month at 33.61¢, rose to a high of 34.04¢ on May 10, and then declined to close the month at a low of 33.23¢. Futures prices showed corresponding movement; July futures opened the month at 32.47¢, reached a high of 32.84¢ on May 11, and closed the month at a low of 32.21¢.

Fabrics

With few exceptions, wide industrial gray goods sales lagged during May in what many mills feared was an early development of the summer slowdown. Already on a four-day week, most mills were barely able to keep sales even with production. If the currently increasing lull continues, the inventory problem which the four-day week solved earlier in the year will again confront producers.

Most of the sales declines were in the ducks such as hose and belting, which were slow despite price reductions of 2¢ a pound. Awning ducks, sateens, chafers, and broken twills continued to sell in moderate volumes for May and June, and chafers also sold into July to the tire manufacturing industry.

Coating sateens sold through June and July at 57¢ for the 53-inch 1.32-yard construction. Headlinings sold to the automotive trade into July at firm prices; while wide drills were less in demand. Osnaburgs were moving slowly, and little business appeared to be developing. Nearby delivery prices for certain sheetings strengthened as goods became scarcer, and sales were made into early July. Print cloths moved sporadically, and a large potential business was reported if prices could be reduced somewhat. Bombazine for raincoat use dropped 2¢ in the face of dull raincoat business.

Current prices for cotton fabrics follow:

Cotton Fabrics

Drills		
59-inch 1.85-yd.	*yd.*	$0.375
2.25-yd.		.33
Ducks		
38-inch 1.84-yd. S. F.	*yd.*	.425
2.00-yd. D. F.		.31/.325
51.5-inch 1.35-yd. S. F.		.52
66-inch 1.02-yd. S.F.		.73
Hose and belting		.62
Osnaburgs		
40-inch 3.65-yd.	*yd.*	.1325/.135
Raincoat Fabrics		
Bombazine, 64 x 60 5.35-yd.	*yd.*	.195
Print cloth, 38½-inch, 64 x 60		.13/.135
Sheeting, 48-inch, 4.17-yd.		.23
52-inch3.85-yd		.2488
Chafer Fabrics		
14-oz./sq. yd. Pl.	*lb.*	.66
11-65-oz./sq. yd. S.		.60
10-80-oz./sq. yd. S.		.62
8.9-oz./sq. yd. S.		.65
14-oz./sq. yd. S.		.59
Other Fabrics		
Headlining, 59-inch 1.35-yd. 2-ply	*yd.*	.565
64-inch 1.25-yd. 2-ply		.6063
Sateens, 53-inch 1.32-yd.		.57
58-inch 1.21-yd.		.6238

CALENDAR

June 16.	New York Rubber Group. Annual Outing. Doerr's Grove, Milburn, N. J.
June 16.	Rhode Island Rubber Club. Pawtucket Golf Club.
June 17.	Akron Rubber Group. Summer Outing.
June 17.	Northern Indiana Section, SPE. Van Orman Hotel, Ft. Wayne, Ind.
June 20-24.	Open House at All Plants of The Timken Roller Bearing Co., Celebrating Its Golden Jubilee.
June 24.	Detroit Rubber & Plastics Group, Inc. Summer Outing. Forest Lake Country Club, Pontiac, Mich.
June 24.	Boston Rubber Group. Summer Outing. United Shoe Country Club, Beverly, Mass.
June 27-July 1.	ASTM. Fifty-Second Annual Meeting. Chalfonte-Haddon Hall, Atlantic City, N. J.
June 29.	Northern California Rubber Group. Golf Tournament.
June 30.	Northern California Rubber Group. Meeting.
July 9.	Chicago Rubber Group. Outing. St. Andrews Golf Club, Wheaton, Ill.
July 30.	Buffalo Rubber Group. Summer Outing. Lancaster Country Club.
Aug. 9.	New York Rubber Group. Golf Tournament. Winged Foot Golf Club, Mamaroneck, N. Y.
Sept. 18-23.	American Chemical Society. Atlantic City, N. J.
Oct. 4.	The Los Angeles Rubber Group, Inc.
Oct. 7.	Detroit Rubber & Plastics Group, Inc. Detroit-Leland Hotel, Detroit, Mich.
Oct. 10.	Upper Midwest Section, SPE.
Oct. 10-14.	ASTM. National Meeting. Fairmont Hotel, San Francisco, Calif.
Oct. 11-12.	ASTM Committee C-16 on Thermal Insulating Materials. Atlantic City, N. J.
Oct. 11.	Buffalo Rubber Group. Hotel Westbrook, Buffalo, N. Y.
Oct. 14.	Boston Rubber Group. Somerset Hotel, Boston, Mass.
Oct. 19.	South Texas Section, SPE.
Oct. 21.	New York Rubber Group. Henry Hudson Hotel, New York, N. Y.
Oct. 21.	Northern Indiana Section, SPE. Van Orman Hotel, Fort Wayne, Ind.
Oct. 25.	Washington Rubber Group.

United States Rubber Statistics—February, 1949

(All Figures in Long Tons, Dry Weight)

	New Supply			Distribution		Month-End Stocks
	Production	Imports	Total	Consumption	Exports	
Natural rubber, total	0	55,242	55,242	43,579	434	109,404
Latex, total	0	2,159	2,159	2,706	0	9,399
Rubber and latex, total	0	57,401	57,401	46,285	434	118,803
Synthetic rubber, total	*31,665 †4,438	1,170	37,273	34,611	335	118,941
GR-S	*26,696 †237	967	27,900	26,898	75	‡99,633
Neoprene	†3,279	0	3,279	2,757	154	4,927
Butyl	*4,969	203	5,172	4,522	2	11,549
Nitrile	‡922	0	922	434	104	2,832
Natural rubber and latex, and synthetic rubber, total	36,103	58,571	94,674	80,896	769	237,744
Reclaimed rubber, total	18,270	0	18,270	17,712	1,012	32,738
Grand Totals	54,373	58,571	112,944	98,608	1,781	270,482

*Government plant production.
†Private plant production.
‡Includes nine tons shipped for export, but not cleared.
Source: Rubber Division, ODC, United States Department of Commerce, Washington, D. C.

COMPOUNDING INGREDIENTS

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.03	$0.05
Rottenstone, domestic	ton	36.00	43.00

Accelerators, Organic

A-10	lb.	.40	.47
A-19	lb.	.52	.58
A-32	lb.	.59	.69
A-77	lb.	.42	.55
A-100	lb.	.42	.55
Accelerator 8	lb.	.83	
49	lb.	.44	.45
89	lb.	1.20	
122	lb.	1.30	
552	lb.	1.80	
808	lb.	.59	.61
833	lb.	1.13	1.15
Acrin	lb.	.75	
Advan	lb.	.55	
Aero AC 50	lb.	.50	.56
165	lb.	.37	.39
Altax	lb.	.35	.37
Arazate	lb.	2.16	
Beutene	lb.	.59	.64
B-J-F	lb.	.27	.32
Butasan	lb.	1.00	
Butazate	lb.	1.00	
Butyl Eight	lb.	1.00	1.05
Zimate	lb.	1.00	
Captax	lb.	.27	.345
C-P-B	lb.	1.95	
Cumate	lb.	1.45	
Cuprax	lb.	.60	.62
Diesterex N	lb.	.50	.57
DOTG (diorthotolyguanidine)	lb.	.44	.50
DPG (diphenylguanidine)	lb.	.39	.45
El-Sixty	lb.	.39	.46
Ethasan	lb.	1.00	
Ethazate	lb.	1.00	
Ethyl Thiurad	lb.	1.00	
Tuads	lb.	1.00	
Tuex	lb.	1.00	
Zimate	lb.	1.00	
Good-Rite Erie	lb.	.32	.34
Hepteen	lb.	.42	.48
Base	lb.	1.80	1.90
Ledate	lb.	1.00	
M-B-T	lb.	.27	.33
M-B-T-S	lb.	.35	.41
Mertax	lb.	.37	1.44
Methesan	lb.	1.00	
Methazate	lb.	1.00	
Methyl Selenac	lb.	1.60	
Tuads	lb.	1.10	
Zimate	lb.	1.00	
Monex	lb.	1.10	
Mono-Thiurad	lb.	1.10	
Morfex 33	lb.	.53	.58
O-X-A-F	lb.	.34	.39
Pentex	lb.	.74	.84
Flour	lb.	.1225	.1325
Phenex	lb.	.40	.45
Pipazate	lb.	1.53	
Rodform products	lb.	1.00	3.00
Rotax	lb.	.39	.41
S. A. 52	lb.	1.10	
57, 62, 67, 77	lb.	1.00	
66	lb.	1.45	
Safex	lb.	1.15	
Santocure	lb.	.55	.62
Selazate	lb.	1.45	
Selenac	lb.	1.45	
SPDX-GH	lb.	.64	.69
Tellurac	lb.	1.45	
Tepidone	lb.	.55	
Tetrone	lb.	1.25	
A	lb.	1.85	
Thalam	lb.	.75	
Thiofide	lb.	.35	.42
Thionex	lb.	1.10	
Thiotax	lb.	.27	.34
Thiurad	lb.	1.10	
Thiuram E	lb.	1.00	
M	lb.	1.10	
Trimene	lb.	.54	.64
Base	lb.	1.03	1.18
Tuex	lb.	1.10	
2-MT	lb.	.53	.55
Ultex	lb.	1.00	1.10
Ureka	lb.	.55	.62
Blend B	lb.	.55	.62
C	lb.	.52	.59
Vulcanex	lb.	.45	
Z-B-X	lb.	2.45	
Zenite	lb.	.33	.35
A	lb.	.42	.44
B	lb.	.39	.41
Special	lb.	.34	.36
Zetax	lb.	.33	.36

Accelerator-Activators, Inorganic

Lime hydrated	ton	8.00	13.50
Litharge, comml.	lb.	.1575	.1675
Eagle, sublimed	lb.	.1475	.1485
Red lead, comml.	lb.	.1575	.1825
Eagle	lb.	.1575	
White lead, basic	lb.	.1475	.1725
Eagle	lb.	.1475	.1575
White lead, silicate	lb.	.155	.1925
Eagle	lb.	.155	.1725
Zinc oxide, comml.†	lb.	.1175	.145

Accelerator-Activators, Organic

Barak	lb.	$0.60	
Curade	lb.	.57	$0.59
D-B-A-	lb.	1.95	
Delac P	lb.	.45	.52
Emersol 110	lb.	.14	.15
120	lb.	.145	.155
130	lb.	.1675	.1775
210 Elaine	lb.	.1125	.135
Emery 600	lb.	.0875	.11
Guantal	lb.	.47	.54
HyFac 430	lb.	.165	.175
431	lb.	.18	.19
Laurex	lb.	.28	.31
Lead oleate	lb.	.33	
MODX	lb.	.295	.345
NA-11	lb.	.65	
Palmalene	lb.	.35	
Plastone	lb.	.27	.30
Polyac	lb.	1.40	
Ridacto	lb.	.22	.24
Seedine	lb.	.1485	.1705
SOAC-KL	lb.	.08	.11
Stearex Beads	lb.	.14⅞	.15⅞
Stearic acid, single pressed	lb.	.14	.15
Double pressed	lb.	.145	.155
Triple pressed	lb.	.1675	.1775
Stearite	lb.	.14⅞	
Tonox	lb.	.50	.59
Zinc stearate	lb.	.34	.36

Alkalies

Caustic soda, flake	100 lbs.	3.45	6.67
Liquid, 50%	100 lbs.	2.40	2.50
Solid	100 lbs.	3.05	6.27

Antioxidants

AgeRite Alba	lb.	2.20	2.30
Gel	lb.	.58	.60
H.P.	lb.	.61	.63
Hipar	lb.	.82	.84
Powder	lb.	.46	.48
Resin	lb.	.63	.65
D	lb.	.46	.48
Stalite	lb.	.46	.48
White	lb.	1.40	1.50
Akroflex C	lb.	.61	.63
Albasan	lb.	.69	.73
Aminox	lb.	.46	.55
Antisol	lb.	.23	.24
Antox	lb.	.54	.56
Aranox	lb.	2.15	
Betanox Special	lb.	.68	.77
B-L-E	lb.	.46	.55
Powder	lb.	.61	.70
B-X-A	lb.	.43	.52
Copper Inhibiter X-872-L	lb.	1.75	
Deenex	lb.	.95	1.05
Flectol H	lb.	.46	.53
Flexamine	lb.	.61	.70
Heliozone	lb.	.25	.26
Neozone (standard)	lb.	.66	.68
A	lb.	.48	.50
C	lb.	.52	.54
D	lb.	.46	.48
DL	lb.	.48	.50
Parazone	lb.	.75	
Perflectol	lb.	.61	.68
Permalux	lb.	1.65	
Rio Resin	lb.	.50	.52
Santoflex 35	lb.	.61	.68
B	lb.	.46	.53
Santovar-O	lb.	1.10	1.17
Santowhite Crystals	lb.	1.65	1.72
MK	lb.	1.40	1.52
MKS	lb.	1.25	1.37
S.C.R.	lb.	.32	.34
Solux	lb.	2.15	
Stabilite	lb.	.46	.48
Alba	lb.	.69	.74
L	lb.	.48	.50
Sunolite	lb.	.23	.24
Sunproof	lb.	.25	.30
Improved	lb.	.23	.28
Jr.	lb.	.18	.23
Thermoflex A	lb.	.82	.84
Tonox	lb.	.50	.59
Tysonite	lb.	.215	.2225
V-G-B	lb.	.55	.64
Zenite	lb.	.33	.35

Antiseptics

Copper naphthenate, 6-8%	lb.	.2275	.2325
G-4	lb.	1.15	2.70
G-11	lb.	3.50	
Pentachlorophenol	lb.	.20	.25
Resorcinol, technical	lb.	.75	
Soligen Drier-Copper 8%	lb.	.2325	
-Zinc 8%	lb.	.22	
Zinc naphthenate, 8-10%	lb.	.2125	.265

Blowing Agents

Ammonium, bicarbonate	lb.	.055	.06
Carbonate	lb.	.185	.22
Sodium bicarbonate	100 lbs.	1.95	3.00
Carbonate, technical	100 lbs.	1.15	5.02
Unicel	lb.	.60	
ND	lb.	1.00	
S	lb.	.25	

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed; contact suppliers for spot prices.

†For trade names, see Color—White, Zinc Oxide.

Bonding Agents

MDI	lb.	$7.00	$7.75
50	lb.	3.50	4.00
Ty-Ply Q. S	gal.	6.75	8.00

Brake Lining Saturants

B.R.T. No. 3	lb.	.024	.025
Resinex L-S	lb.	.0225	.03

Carbon Blacks

Conductive Channel—CC

Continental R-20, -40	lb.	.055	.102
Kosmos/Dixie	lb.	.15	.185
Spheron C	lb.	.12	.165
N	lb.	.22	.25
Voltex	lb.	.15	.185

Easy Processing Channel—EPC

Continental AA	lb.	.055	.102
Kosmobile 77/Dixiedensed 77	lb.	.07	.1125
Micronex W-6	lb.	.07	.1125
Spheron #9	lb.	.069	.117
Witco #12	lb.	.055	.102
Wyex	lb.	.07	.115

Hard Processing Channel—HPC

Continental F	lb.	.055	.102
HX	lb.	.07	.115
Kosmobile S/Dixiedensed S	lb.	.07	.1125
Micronex Mk. II	lb.	.07	.1125
Spheron #4	lb.	.069	.117
Witco #6	lb.	.555	.102

Medium Processing Channel—MPC

Arrow TX	lb.	.07	.115
Continental A	lb.	.055	.102
Kosmobile S-66/Dixiedensed S-66	lb.	.07	.1125
Micronex Standard	lb.	.07	.1125
Spheron #6	lb.	.069	.117
Witco #1	lb.	.055	.102

Conductive Furnace—CF

Statex A	lb.	.08	.10

Fast Extruding Furnace—FEF

Statex M	lb.	.0525	.095

Fine Furnace—FF

Statex B	lb.	.055	.0975
Sterling 99	lb.	.065	.105
105	lb.	.12	.16

High Abrasion Furnace—HAF

Philblack O	lb.	.07	.1145
Vulcan #1, #3	lb.	.074	.117

High Modulus Furnace—HMF

Continex HMF	lb.	.05	.075
Kosmos 40/Dixie 40	lb.	.05	.09
Kosmos 50/Dixie 50	lb.	.055	.095
Modulex	lb.	.05	.075
Philblack A	lb.	.0525	.095
Statex 93	lb.	.0475	.09
Sterling L	lb.	.05	.09
SO	lb.	.055	.095

Reinforcing Furnace—RF

Kosmos 60/Dixie 60	lb.	.074	.1125

Semi-Reinforcing Furnace—SRF

Continex SRF	lb.	.035	.055
Essex	lb.	.035	.055
Furnex	lb.	.0325	.075
Non-staining	lb.	.035	.0775
Gastex	lb.	.035	.075
Kosmos 20/Dixie 20	lb.	.035	.075
Pelletex	lb.	.035	.075
Sterling NS, R, S	lb.	.035	.075

Very Fine Furnace—VFF

Statex K	lb.	.07	.1125

Fine Thermal—FT

P-33	lb.	.05	

Medium Thermal—MT

Thermax	lb.	.03	
Stainless	lb.	.035	

Chemical Stabilizers

Lead stearate	lb.	.36	.38
Vanstay 16, 25	lb.	.33	.35
White lead, basic	lb.	.1625	.1725

Colors

Black

Black Paste #25	lb.	.22	.40
BK Iron Oxides	lb.	.03	.11
Lampblack, comml.	lb.	.07	.30
Superjet	lb.	.0675	.1025
Mapico	lb.	.1075	.11
MB Mineral Blacks	lb.	.0315	.0675

Blue

Du Pont	lb.	.75	3.95
Heveatex pastes	lb.	.80	1.45
Stan-tone	lb.	1.00	1.35
Toners	lb.	.30	3.50

Brown

Brown Paste #5, #10	lb.	.35	.45
Iron oxide, brown	lb.	.03	.0325
Mapico	lb.	.125	
Tan	lb.	.195	
Metallic brown	lb.	.03	.0325
Plastics brown	lb.	.0565	.065
Sienna, burnt	lb.	.0375	.15
Raw	lb.	.04	.1275
Umber, burnt	lb.	.0475	.08
Raw	lb.	.0375	.06

Green

Chrome	lb.	$0.13	$0.4775
Oxide	lb.	.33	.40
Du Pont	lb.	1.10	3.20
G-4099	lb.	.325	.33
G-5299, -6099	lb.	.315	.32
G-7599	lb.	.38	.385
G-9869	lb.	.75	.90
G-9976	lb.	.85	1.00
Heveatex pastes	lb.	.95	1.85
Stan-Tone	lb.	1.50	3.30
Toners	lb.	.35	4.00

Orange

Du Pont	lb.	2.75	
Orange Paste #13	lb.	1.35	1.50
Stan-Tone	lb.	1.65	2.25
Toners	lb.	.30	1.50

Red

Antimony trisulfide	lb.	.55	.68
R. M. P. Sulfur Free	lb.	.63	.68
R. P. M. No. 3	lb.	.55	.60
Cadmium red lithopone	lb.	1.15	1.55
Cadmolith Red	lb.	.92	1.00
Du Pont	lb.	.34	1.85
Indian Red	lb.	.115	.1175
Iron oxide, red	lb.	.0525	.0925
Light	lb.	.115	.1175
Mapico	lb.	.115	.1175
Red Paste #17, I-2	lb.	.95	1.10
Rub-Er-Red	lb.	.0975	
Stan-Tone	lb.	1.10	3.05
Toners	lb.	.25	4.15
Tuscan Red	lb.	.245	.25
Venetian Red	lb.	.035	.049

White

Antimony oxide	lb.	.34	.37
Lithopone, titanated	lb.	.0825	.085
Cryptone BT	lb.	.0825	.085
Titanium pigments:			
Rayox LW	lb.	.195	.205
R-110	lb.	.215	.225
Ti-Cal	lb.	.075	.0825
Ti-Pure	lb.	.195	.225
Titanox-A, -AA	lb.	.195	.20
RA, RA-10	lb.	.0775	.0825
RC	lb.	.215	.225
RC-HT	lb.	.075	.08
Zopaque	lb.	.195	.205
Zinc oxide, comml.	lb.	.1175	.145
Azo ZZZ-11, -44, -55	lb.	.1175	.12
-66	lb.	.14	.1425
35% leaded	lb.	.1225	.125
Eagle AAA, lead free	lb.	.1175	.12
5% leaded	lb.	.1175	.12
35% leaded	lb.	.1225	.125
50% leaded	lb.	.125	.1275
Florence Green Seal-8	lb.	.135	.1375
Red Seal-9	lb.	.13	.1325
White Seal-7	lb.	.14	.1425
Horsehead XX-4, -78	lb.	.1175	.12
Kadox-15, 17, -72	lb.	.1175	.12
-25	lb.	.14	.1425
Lehigh, 35% leaded	lb.	.1225	.125
50% leaded	lb.	.125	.1275
Protox-166	lb.	.1175	.12
St. Joe, lead free	lb.	.12	.1225
Standard, 5% leaded	lb.	.1175	.12
Zinc sulfide, comml.	lb.	.1225	.125
Cryptone ZS-800	lb.	.1225	.125

Yellow

Cadmium yellow lithopone	lb.	.95	
Cadmolith Yellow	lb.	.92	.100
Chrome	lb.	.32	
Du Pont	lb.	.34	1.85
Iron oxide, yellow	lb.	.0141	.0925
Mapico	lb.	.09	.0925
Ocher, yellow	lb.	.0125	.0275
Stan-Tone	lb.	1.00	1.55
Toners	lb.	.50	1.37
Yellow D	lb.	1.25	1.35

Dispersing Agents

Darvan Nos 1, 2	lb.	.21	.30
Daxad Nos. 11, 23, 27	lb.	.19	.35
No. 21	lb.	.08	.25
Stan-Chem	lb.	.1225	.2587
Triton R-100	lb.	.12	.25

Dusting Agents

Extrud-o-Lube, conc	gal.	1.57	
Glycerized Liquid Lubricant, concentrated	gal.	1.25	
Lubrex	lb.	.25	.30
Mica	lb.	.0675	.075
Pyrax A	ton	12.50	
W. A.	ton	15.00	
Snow Crest Talc	ton	33.00	35.00
Vanfre	gal.	2.00	2.50
Zinc stearate	lb.	.34	.36

Extenders

Advagum	lb.	.65	
B. R. S. 700	lb.	.0175	.026
B. R. T. No. 7	lb.	.0265	.0275
Califlux 510, 550	lb.	.025	.0325
G. P	lb.	.0125	.02
Dielex B	lb.	.06	
Factice, Amberex	lb.	.30	.38
Brown	lb.	.12	.33
Neophax	lb.	.18	1.35
Ozonite	lb.	.2365	
White	lb.	.13	.32
Mineral Rubbers			
Black Diamond	ton	$25.00	$30.00
Extender 600	lb.	.18	
Hard Hydrocarbon	ton	44.50	46.50
No. 38	ton	25.00	
Parmr	ton	21.00	29.00
Nuba No. 1, 2	lb.	.04	
No. 3X	lb.	.065	
Rubber substitute, brown	lb.	.18	.317
White	lb.	.16	.33
Synthetic 100	lb.	.41	
Vinsol Resin	lb.	.025	.035
Vistanex	lb.	.32	

Fillers, Inert

Asbestos fiber	ton	28.50	88.00
Barytes, floated, white	ton	35.05	49.65
Off-color, domestic	ton	19.00	20.00
No. 1	ton	33.35	47.75
2	ton	31.35	
Blanc fixe	ton	77.50	113.00
Clays:			
Aluminum Flake	ton	16.00	22.00
#5	ton	21.00	
Burgess No. 20	ton	33.00	
No. 30	ton	35.00	
Iceberg	ton	50.00	
Champion	ton	14.00	
Crown	ton	13.00	29.50
Hi-White R	ton	15.00	33.00
Hydratex R	ton	30.00	
Paragon	ton	13.50	31.50
McNamee	ton	13.50	
Stan-Tex White	ton	25.00	
Stellar-R	ton	50.00	
Suprex	ton	14.00	33.00
W-1291 English	ton	53.00	55.00
Cryptone BA, CB, MS	lb.	.0775	.08
Flocks:			
Cotton, dark	lb.	.095	.112
Dyed	lb.	.45	.85
White	lb.	.12	.20
Fabrifil X-24-G	lb.	.095	
X-24-W	lb.	.135	
Filfloc 6000	lb.	.16	
F-40-900	lb.	.105	
Solka-Floc	lb.	.05	.15
Kalite	ton	40.00	
Lead sulfate, basic	lb.	.1475	.1575
Lithopone, comml.	lb.	.0625	.06 5/8
Albalith	lb.	.0625	.065
Astrolith	lb.	.06 3/8	.0675
Eagle	lb.	.0725	.075
Sunolith	lb.	.06 3/8	.0675
Mica	lb.	.0675	.075
No. 1 Silica	ton	40.00	
Pyrax A	ton	12.50	
W. A.	ton	15.00	
Silical	ton	7.00	55.00
SL Slate Flour	ton	17.00	27.00
Suspenso	ton	22.00	
Swansdown	ton	20.00	
Terra Alba 1319	ton	27.00	
Ti-Cal	lb.	.0675	
Titanox-C, RCHT	lb.	.07	.075
Whiting, limestone	ton	11.00	27.50
Paxinosa	ton	9.50	16.50
Witco	ton	6.50	

Finishes

Black-Out	gal.	4.50	8.00
Flexible Rubber Paints	gal.	4.00	9.00
Flocks			
Cotton, dark	lb.	.095	.112
Dyed	lb.	.45	.85
White	lb.	.12	.20
Rayon, colored	lb.	.90	1.50
White	lb.	.75	1.25
Rubber lacquer, clear	gal.	1.00	2.00
Colored	gal.	2.00	3.50
Shoe varnish	gal.	1.45	
Talc	ton	14.00	32.00
Vinylum #45	lb.	1.50	1.65
Wax, Bees	lb.	.48	.69
Carnauba	lb.	.75	1.10
Montan	lb.	.26	.32
No. 118, colors	gal.	.86	1.41
Neutral	gal.	.76	1.31
Van Wax	gal.	1.25	1.30

Latex Compounding Ingredients

Accelerator 89	lb.	1.20	
122	lb.	1.30	
552	lb.	1.80	
Acrysol GS, 15% solids	lb.	.13	.185
Advawet 10	lb.	.35	
Aerosol	lb.	.35	
AgeRite Dispersions	lb.	.60	2.25
Amberex Solutions	lb.	.1675	.18
Aquablaks	lb.	.0775	.165
Aquarex BBX, Conc	lb.	.78	
D	lb.	.76	
MDL Paste	lb.	.30	
ME	lb.	.92	
NS	lb.	.60	
SMO	lb.	.50	
Areskap 50	lb.	.30	.38
100, dry	lb.	.60	.72
Aresket 240	lb.	.30	.38
300, dry	lb.	.60	.72
Aresklene 375	lb.	.42	.57
400, dry	lb.	.70	.84
Black No. 25, dispersed	lb.	.22	
Casein	lb.	.18	.28
CW-12	lb.	.85	
CW-37	lb.	.70	
Darex Copolymers Nos. 3-L, 9-L, X34-L, X44-L	lb.	.365	.50
Dispersed Sulfur No. 2	lb.	$0.10	$0.12
Ethyl Thiurad	lb.	1.00	
Factice dispersions	lb.	.23	.44
Laton L	lb.	.075	.0775
Ludox	lb.	.1675	.1925
Marmix	lb.	.36	.43
Micronex, colloidal	lb.	.06	.07
pHR Latex Chemical	lb.	2.00	
Pip-Pip	lb.	1.80	
R-2 Crystals	lb.	1.75	
Resin Emulsion A-155	lb.	.13	.18
P-370	lb.	.125	.175
Resin V	lb.	.13	
Santomerse D	lb.	.43	.65
S	lb.	.12	.25
Setsit No. 5	lb.	.75	1.00
SPDX-GL	lb.	.95	
Stablex A	lb.	.90	1.10
B	lb.	.50	.95
G	lb.	.50	.70
L	lb.	.30	.40
Sulfur Dispersion, 50%	lb.	.07	.15
66%	lb.	.09	.17
73%	lb.	.10	.12
Tergitol wetting agents	lb.	.265	.37
Triton R-100	lb.	.1375	.2425
Zinc oxide, dispersed	lb.	.13	.20

Mold Lubricants

Aluminum stearate	lb.	.30	.31
Aquarex D	lb.	.76	
L Paste	lb.	.85	
MDL Paste	lb.	.30	
Carbowax compounds	lb.	.24	.35
Colite Concentrate	gal.	.90	1.15
ELA	lb.	.80	
DC Mold Release	lb.	5.20	6.00
Emulsion No. 35	lb.	2.08	3.50
DC 7	lb.	6.20	6.80
Glycerized Liquid Lubricant, concentrated	gal.	1.25	
Lubrex	lb.	.25	.30
Mica	lb.	.0675	.075
Mold Paste	lb.	.25	
Monten Wax	lb.	.57	
Para Lube	lb.	.046	.048
Sodium stearate	lb.	.40	.56
Talc	ton	14.00	32.00
Vanfre	gal.	2.00	2.50

Odorants

B-3223	lb.	2.50	
Coumarin	lb.	3.00	3.15
Curodex 19	lb.	4.75	
188	lb.	5.75	
198	lb.	6.75	
GD-4440	lb.	3.50	
-5280, -5424, -53481	lb.	2.50	
-5296	lb.	1.25	
-5386	lb.	2.00	
Parador A	lb.	2.25	
C	lb.	3.25	
E	lb.	.55	
F	lb.	.47	
I	lb.	2.00	
K	lb.	.43	
Reodor Nos. 1, 5	lb.	2.50	
No. 10	lb.	.40	
Rodo No. 0	lb.	4.00	4.50
No. 10	lb.	5.00	5.50
Vanillin	lb.	3.00	4.05

Plasticizers and Softeners

Akroflex C	lb.	.61	.63
Aro Lene #1980	lb.	.10	.12
Bardol 639	lb.	.0275	.045
Bondogen	lb.	.55	.60
BRC 20	lb.	.0125	.0145
B. R. H. No. 2	lb.	.02	.029
B. R. S. 700	lb.	.0175	.029
R. R. T. No. 4	lb.	.0225	.0235
B. R. V.	lb.	.0325	.049
Bunarax resins	lb.	.06	.129
Bunnatol G. S.	lb.	.40	.505
Butac	lb.	.105	.115
BxDC	lb.	.40	.41
Califlux 500, 550	lb.	.025	.03
G P	lb.	.0125	.0225
R-100	lb.	.05	.05
Carbonex S Flakes	lb.	.0475	.0525
S Plastic	lb.	.046	.051
644	lb.	.0375	.04
Contogums	lb.	.0875	.111
Cumar EX	lb.	.0525	
MH	lb.	.065	.11
V	lb.	.0975	.1275
Dielex B	lb.	.06	
Dipentene, American	gal.	.35	
Sunny South	gal.	.35	
Dipolymer Oil	gal.	.33	.38
Dispersing Oil No. 10	lb.	.0525	.055
Duraplex C-50 LV, 100%	lb.	.25	.295
Dutrex 6	lb.	.025	.035
Emersol 110	lb.	.14	.15
120	lb.	.145	.155
130	lb.	.1675	.1775
210 Elaine	lb.	.1125	.135
Emery 600	lb.	.0875	.11
Flexol Plasticizer 3GH	lb.	.42	.44
3GO	lb.	.515	.535
4GO	lb.	.36	.38
8N8	lb.	.375	.395
DOP	lb.	.43	.455
R-I	lb.	.47	.475
TOF	lb.	.47	.49
TWS	lb.	.405	.425

Galex W-100	lb.	$0.135	$0.1725
W-100D	lb.	.1325	.17
G. B. Light Process Oil	lb.	.025	.0325
Heavy Resin Oil	lb.	.0225	.0325
Hercolyn	lb.	.1112	.1347
Hyfac 430	lb.	.165	.175
431	lb.	.18	.19
Indonex	gal.	.12	.17
JMH	lb.	.65	.68
Monoplex DBS	lb.	.58	.59
DOA	lb.	.425	.445
DOS	lb.	.57	.59
5	lb.	.70	.71
Nevillac oils	lb.	.33	
Resins	lb.	.31	.45
Neville LX-685	lb.	.12	
R Resins	lb.	.105	.155
Nevinol	lb.	.17	
Nevoll	lb.	.0325	.0425
No. 1-D heavy oil	lb.	.055	
Palmalene	lb.	.15	
Para Flux, regular	gal.	.10	.2025
No. 2016	gal.	.165	.24
Heavy	gal.	.155	
Para Resins	lb.	.04	.045
Paradene Resins	lb.	.065	.075
Para Lube	lb.	.046	.048
Paraplex AL-111	lb.	.33	.3375
G-25	lb.	.76	.77
-40	lb.	.43	.44
-50	lb.	.395	.405
Peptizene #2	lb.	.90	
Pepton 22	lb.	.72	.75
Picco-10, -25	lb.	.12	.17
-75, -100	lb.	.115	.17
480 Oilproof resin	lb.	.13	
S. O. S.	gal.	.29	.34
Piccocizer 30	lb.	.055	.06
Piccolastic Resins	lb.	.139	.275
Piccolyte Resins	lb.	.15	.2075
Piccoumaron Resin 427-R	lb.	.12	.17
Resins	lb.	.06	.17
Piccovars	lb.	.12	.125
Piccovol	lb.	.025	.04
Pictar	gal.	.25	.30
Pigmentar	gal.	.345	.435
Pigmentaroil	gal.	.32	.41
Pine Oil, American	gal.	.45	.55
Sunny South	gal.	.45	.55
Plastender S	lb.	.0375	.04
Plasticizer 35	lb.	.205	.24
36	lb.	.305	.34
42	lb.	.34	.40
2175	lb.	.46	.56
3425	lb.	.605	
3497	lb.	.61	
3560	lb.	.56	
B	lb.	.35	.45
SC	lb.	.50	.57
Plastoflex #3, SC	lb.	.50	
#50	lb.	.38	
FP-6	lb.	.52	
Plastogen	lb.	.0775	.08
Plastolein	lb.	.32	.53
Plastone	lb.	.22	.30
PS-60 Resin	lb.	.35	
PT67 Light Pine Oil	gal.	.60	.70
101 Pine Tar Oil	gal.	.32	.43
400 Light Pine Tar	gal.	.345	.455
600 Med. Pine Tar	gal.	.345	.455
800 Heavy Pine Tar	gal.	.345	.455
R-19, R-21 Resins	lb.	.1075	
Reogen	lb.	.1175	.12
Resin C pitch	lb.	.02	.0285
R6-3	lb.	.38	.40
Resinex	lb.	.0325	.0375
L-4	lb.	.0225	.03
RPA No. 2	lb.	.65	
No. 3	lb.	.46	
5	lb.	.57	
RSN Flux	gal.	.10	.19
Rubberol	lb.	.215	
S-Polymers	lb.	.44	
Santicizer B-16	lb.	.52	.57
E-15	lb.	.49	.54
M-17	lb.	.46	.51
No. 140	lb.	.3225	.38
Seedine	lb.	.1485	.1705
Solvenol	gal.	.56	.58
Staybelite Resin	lb.	.06	.065
Stearex Beads	lb.	.14$\frac{7}{8}$	.15$\frac{7}{8}$
Stearic acid, single pressed	lb.	.14	.15
Double pressed	lb.	.145	.155
Triple pressed	lb.	.1675	.1775
Stearite	lb.	.14$\frac{7}{8}$	
Syn-Tac	gal.	.33	.35
Synthol	lb.	.245	
TR-11	lb.	.035	
Turgum S	lb.	.0875	.0975
Tysonite	lb.	.215	.2225
Vistac No. 1	gal.	1.21	1.32
2	gal.	1.62	1.66
4	gal.	1.76	1.80
X-1 Resinous Oil	lb.	.0175	.0325
XX-100 Resin	lb.	.0525	

Reclaiming Oils

Bardol 639	lb.	.0275	.045
B. R. H. No. 2	lb.	.02	.029
B. R. T. No. 4	lb.	.0225	.0235
B. R. V.	lb.	.0325	.049
BWH-1	lb.	.14	
Dipolymer Oil	gal.	.33	.38
Dispersing Oil No. 10	lb.	.0525	.055
G. B. Reclaiming Oil	gal.	.12	.18
Heavy Resin Oil	lb.	.0225	.0325
LX-77	gal.	.18	.30
-572	gal.	.23	.34
No. 1621	lb.	$0.025	$0.035
Picco C-10	gal.	.25	.30
C-28	gal.	.33	.38
C-33	gal.	.20	.25
C-42	gal.	.27	.32
D-4	gal.	.23	.28
E-5	gal.	.21	.26
Q-Oil	gal.	.246	.296
PT 101 Pine Tar Oil	gal.	.32	.43
150 Pine Solvent	gal.	.44	.55
Solvenol	gal.	.56	.58
S. R. O.	lb.	.015	.0225
Wilcor Nos. 111, 151	gal.	.26	.30
X-1 Resinous Oil	lb.	.0175	.0325
-60 Solvent	gal.	.24	.38

Reinforcers, Other Than Carbon Black

BRC 20	lb.	.0125	.0145
Bunarex resins	lb.	.06	.125
Calcene T	ton	45.00	55.00
Calco S. A.	lb.	.75	
Carbonex S flakes	lb	.0475	.0525
S Plastic	lb.	.046	.051
644	lb.	.0375	.04
Clays			
Aluminum Flake	ton	16.00	22.00
No. 5	ton	20.00	
Buca	ton	40.00	
Catalpo	ton	30.00	
Dixie	ton	14.00	
Hydratex R	ton	30.00	
L. G. B	ton	17.00	
Paragon (R)	ton	13.50	31.50
Pigment No. 33	ton	30.00	
Suprex	ton	14.00	32.00
Witco Nos. 1, 2	ton	25.00	
Clearcarb	lb.	.1175	.1225
Cumar EX	lb.	.0525	
MH	lb.	.065	.1175
V	lb.	.0975	.1275
Darex Copolymer Nos. 3			
X 34	lb.	.35	.37
No. X 43	lb.	.36	.38
G Resin	lb.	.08	
Good-Rite Resin 50	lb.	.415	.455
Magnesia, Calcined			
Extra Light, U. S. P.	lb.	.34	
K&M	lb.	.31	
Light, technical	lb.	.28	
No. 101	lb.	.175	
Heavy, technical	lb.	.05	.1275
Medium light, technical	lb.	.12	
Magnesium carbonate	lb.	.09	.135
Marbon S, S-1	lb.	.36	.43
Millical	ton	27.50	
Multiflex MM	ton	105.00	
Special	ton	125.00	
Neville R Resins	lb.	.10	.155
Para Resins 2457, 2718	lb.	.04	.045
Picco-75, -100	lb.	.115	.17
Piccolastic Resins	lb.	.139	.275
Piccolyte Resins	lb.	.15	.2075
Piccoumaron Resins	lb.	.06	.17
Piccovars	lb.	.12	.125
Pliolite, Natural Rubber	lb.	.75	.82
Milled	lb.	.85	.92
S-2, Milled	lb.	.74	.81
S-3,-6	lb.	.36	.43
S-6 Masterbatches	lb.	.35	.50
PS-60 Resin	lb.	.35	
Resin C Pitch	lb.	.02	.0285
Resinex	lb.	.0325	.0375
Rubber Resin LM-4	lb.	.28	.35
S-Polymers	lb.	.44	
Silene EF	lb.	.055	.06
Super Multifex	ton	124.00	
Witcarb R	ton	100.00	
R-12	ton	32.00	
Zinc oxide, commercial†	lb.	.1175	.145

Retarders

Cumar RH	lb.	.105	
Delac J	lb.	.55	.60
E-S-E-N	lb.	.36	.41
Good-Rite Vultrol	lb.	.55	.57
R-17 Resin	lb.	.1075	
Retarder ASA	lb.	.45	
PD	lb.	.36	
W	lb.	.43	
Retardex	lb.	.51	.54
RM	lb.	1.25	
Thionex	lb.	1.25	
Vultrol	lb.	.50	.55

Solvents

Benzol, industrial	gal.	.20	.21
Bondogen	lb.	.55	.60
Carbon bisulfide	lb.	.0625	.095
Tetrachloride	lb.	.08	.115
Cosol	gal.	.30	.38
GVL	lb.	1.00	
Nevsol	gal.	.185	.25
Picco Hi-Solv Solvents	gal.	.21	.26
Skellysolve-B	gal.	.141	
C	gal.	.133	
R	gal.	.100	
Tollac	gal.	.195	.25
Toluol, industrial	gal.	.19	.25
2-50-W Hi-Flash Solvent	gal.	.37	
Xylol, industrial	gal.	.23	.28

Synthetic Resins

Geon Latices (dry wt.)	lb.	.465	.60
Paste Resins	lb.	.34	.60
Plastics	lb.	.365	.85
Polyblend	lb.	.43	.58
Polyvinol resins	lb.	.34	.58
Marvinol VR-10	lb.	.33	.50

Synthetic Rubbers and Latices

Butaprene NAA	lb.	$0.44	$0.465
NF	lb.	.39	.415
NL	lb.	.40	.425
NXM	lb.	.47	.495
Butaprene Latex (dry wt.)			
NI, NXM	lb.	.455	.49
Chemigum N-1	lb.	.53	.60
Chemigum Latex Type 101			
(dry wt.)	lb.	.37	.40
Hycar OR-15, -15EP	lb.	.52	.53
OR-25, -25 EP	lb.	.45	.46
OR-25 NS	lb.	.47	.48
OS-10	lb.	.50	.51
Hycar Latex (dry wt.)			
1501, 1531, 1551	lb.	.49	.54
1502, 1552, 1562	lb.	.42	.47
1532	lb.	.435	.485
Neoprene Latex (dry wt.)			
Type 571, 842 842-A	lb.	.29	.40
572, 700	lb.	.30	.41
601, 601-A	lb.	.32	.43
Neoprene Type AC, CG	lb.	.50	.53
E	lb.	.65	.68
FR, KNR	lb.	.75	.78
NC	lb.	.32	.35
Paracril 18-80	lb.	.43	.45
26NS60, 26NS90	lb.	.44	.46
35NS90	lb.	.51	.53
Paracril Latex Type H			
(55%)	lb.	.38	.42
Paraplex X-100	lb.	1.00	
Silastic	lb.	2.35	4.05

Tackifiers

Bunarex-10, 25, -40	lb.	.07	.125
Contogums	lb.	.0875	.11
Galex W-100	lb.	.135	.1725
W-100D	lb.	.1325	.17
Hercolyn	lb.	.1122	.1347
Indopol H300	lb.	1.21	1.32
Natac	lb.	.10	.11
Nevindene	lb.	.125	.155
Picco-10, -25	lb.	.12	.17
Piccolastic Tackifiers	lb.	.139	.275
Piccolyte Resins	lb.	.15	.2075
Piccoumaron Resin 427-R	lb.	.12	.17
Resins	lb.	.06	.17
Staybelite Resin	lb.	.06	.065
Synthetic 100	lb.	.41	
Synthol	lb.	.205	
Vistac No. 1	gal.	1.32	
No. 2	gal	1.66	
4	gal.	1.80	
Vistanex	lb.	.32	

Vulcanizing Agents

Dibenzo G-M-F	lb.	2.65	
Ethyl Tuads	lb.	1.00	
G-M-F-	lb.	2.50	
Litharge, commercial	lb.	.1475	.1675
Eagle, sublimed	lb.	.1475	.1485
Magnesia, Calcined			
Carey	lb.	.28	
Extra-light, U. S. P.	lb.	.34	
Heavy, technical	lb.	.05	.31
K&M Neoprene Grade	lb.	.31	
Light, technical	lb.	.22	.28
No. 101	lb.	.175	
Medium-light, technical	lb.	.175	
Methyl Selenac	lb.	1.60	
Tuads	lb.	1.10	
Red Lead, commercial	lb.	.1575	.1825
Eagle	lb.	.1575	
Sulfur flour, comml	100 lbs.	1.60	2.30
Black Bird	lb.	.036	.041
Calco	lb.	.0175	.051
Chloride	lb.	.0325	.0825
Crystex	lb.	.195	
Insoluble 60	lb.	.13	.135
Rubbermakers	100 lbs.	1.75	2.45
Spider Brand	lb.	.023	.044
Stauffer	lb.	.0175	.0285
Telloy	lb.	2.00	
Vandex	lb.	2.00	
Vultac Nos. 1, 2	lb.	.38	.45
No. 3	lb.	.42	.49
White lead silicate	lb.	.155	.1925
Eagle	lb.	.155	.1725

United States Motor Vehicle Factory Sales

(Number of Vehicles)

	Passenger Cars	Motor Trucks	Motor Coaches	Total
1946				
1st qtr. total	199,864	117,692	1,259	318,915
1947				
1st qtr. total	815,145	323,094	3,997	1,142,236
1948				
1st qtr. total	929,926	346,860	3,869	1,280,655
1949				
January	326,019	104,599	658	431,276
February	324,547	101,700	418	426,665
March	402,402	115,171	545	518,118
1st qtr. total	1,052,968	321,470	1,621	1,376,059

SOURCE: Automobile Mfrs. Association, Detroit, Mich.

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

Effective July 1, 1947

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.25 per line (ten words)	Light face type 40c per line (ten words)	Light face type $1.00 per line (ten words)
Bold face type $1.60 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.40 per line (eight words)
Allow nine words for keyed address.	**Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.**	*Letter replies forwarded without charge, but no packages or samples.*

SITUATIONS WANTED

CHEMIST-PRODUCTION MANAGER. BROAD EXPERIENCE IN mechanical goods, belting, hose, and sponge rubber from compound development to plant management. Desire position with medium sized or small company in technical or management capacity. Central or Eastern location preferred. Address Box No. 371, care of INDIA RUBBER WORLD.

FACTORY MANAGER AVAILABLE

Thirty years' experience—factory manager past ten years. Production and profit record unexcelled. Complete charge of hose manufacture—all types, extruded products, molded goods, V-belts. Complete knowledge industrial, experimental, and layout engineering. Best references. Address Box No. 375, care of INDIA RUBBER WORLD.

PRODUCTION MANAGER — TECHNICAL SUPERINTENDENT desires new connections. Over 20 years' of practical experience in large and small plant manufacturing all kinds of mechanical rubber goods including sponge rubber. Location in West desired. Address Box No. 377, care of INDIA RUBBER WORLD.

RUBBER TECHNOLOGIST, B.S., 1931, MARRIED, 7 YEARS AS chief chemist in insulated wire industry with additional experience in molded goods. Good factory trouble-shooter. Reliable, efficient, and energetic. Experienced in management of labor. Am interested in locating in a small or medium-sized plant which needs a rubber chemist who can control quality and supervise production. Available immediately. Address Box No. 378, care of INDIA RUBBER WORLD.

RUBBER CHEMIST-ENGINEER, EIGHT YEARS' EXPERIENCE in laboratory—plant operations, compounding research, factory quality and processing control in tires, tubes, and related products, desires new connections with small, progressive organization. Recommendations. B.S. in Chem. Eng.; married; age 30. Address Box No. 381, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITY

OPEN TIME AVAILABLE FOR RUBBER COMPOUNDING AND mixing to your specification. Excellent service. Nominal rates. Inquiries invited. ELM CITY RUBBER COMPANY, P. O. Box 1864, New Haven, Conn.

SITUATIONS OPEN

LATEX CHEMIST

Several years experience in compounding of natural and synthetic latex for use in dipping, impregnation, and lamination. Desire aggressive individual to initiate and carry through development of new compounds. Please give details of experience, education, and salary requirements. Location in New York area. Address Box No. 364, care of INDIA RUBBER WORLD.

CANVAS AND RUBBER FOOTWEAR: EXCELLENT OPPORtunity to achieve key position in newly established plant located in Southern California. Openings for stitching room, making room, and mill room men, also pattern maker. All must be thoroughly familiar with the latest methods. State full information in first letter, indicating salary expected. All applications kept confidential. Address Box No. 365, care of INDIA RUBBER WORLD.

TECHNICAL SALES: NEW PLANT LOCATED IN SOUTHERN California has opening for aggressive sales manager for molded goods division. Must be experienced, be prepared to take charge of sales, development of new products, and be familiar with the manufacturing process. State full details and expected salary. All replies treated confidentially. Address Box No. 366, care of INDIA RUBBER WORLD.

WANTED—RUBBER COMPOUNDER AND DESIGNER, EXPERIence in braided hose and belting essential. State age, height, weight, education, and job background, with previous salaries earned Address Box No. 367, care of INDIA RUBBER WORLD.

WANTED—SALES REPRESENTATION BY ESTABLISHED RUBber manufacturer selling all types of industrial rubber products, molded rubber-to-metal adhesion, rolls and rollers, tank lining, pulley lagging, etc. Commission basis. Prefer men now contacting industrial trade with allied lines. Territories open. Northern Ohio, Pennsylvania, New York, New England, Maryland, West Virginia, Southern Ohio, and Southern Illinois. Address Box No. 368, care of INDIA RUFFER WORLD.

OPPORTUNITY—DIRECTOR OF RUBBER LABORATORY, Chemical Engineer. Mechanical rubber manufacturer needs aggressive, executive-type rubber chemist with compounding knowledge and organic chemistry background. Belting and hose compounding essential. Manager of Research and Rubber Development Division open for right man. State age, education, job experience, recent earnings. Address Box No. 369, care of INDIA RUBBER WORLD.

(Classified Advertisements Continued on Page 401)

United States Imports, Exports, and Reexports of Crude and Manufactured Rubber

	February, 1949 Quantity	February, 1949 Value
Imports for Consumption of Crude and Manufactured Rubber		
UNMANUFACTURED, Lbs.		
Crude rubber	123,743,391	$21,549,791
Rubber latex	4,835,681	1,030,107
Balata	146,137	53,665
Jelutong or Pontianak	172,313	91,362
Gutta percha	20,549	16,328
Chicle	2,192,979	1,590,655
Synthetic rubber	2,619,752	490,033
Scrap rubber	1,036,479	18,033
TOTALS	134,767,281	$24,839,974
MANUFACTURED		
Tires: auto, bus, truck . . . *no.*	77	$2,299
Bicycle . . . *no.*	430	271
Inner tubes: auto, etc. . . . *no.*	172	890
Footwear: boots . . . *prs.*	480	675
Shoes and overshoes . . . *prs.*	7,548	10,769
Rubber-soled canvas shoes . . . *prs.*	19,631	7,205
Rubber balls: golf . . . *no.*	7,200	2,759
Tennis . . . *no.*	4,325	818
Other athletic	.....	13,957
Toys, except balloons	.....	13,559
Hard rubber goods:		
Combs . . . *no.*	288	66
Other	.....	302
Rubber and cotton packing . . . *lbs.*	347	465
Gaskets, valve packing	.....	192
Belting . . . *lbs.*	4,236	5,783
Hose and tubing	.....	294
Nipples and pacifiers . . . *gross*	500	1,102
Rubber instruments . . . *doz.*	103	205
Heels and soles . . . *lbs.*	31,460	568
Rubber bands . . . *lbs.*	125	54
Soft rubber products	.....	15,106
Other rubber goods	.....	1,800
TOTALS	.....	$79,139
GRAND TOTALS, ALL RUBBER IMPORTS	.....	$24,919,113
Exports of Domestic Merchandise		
UNMANUFACTURED, Lbs.		
Chicle and chewing gum bases	177,726	88,109
Balata	800	2,550
Synthetic rubber: GR-S	167,379	50,599
Butyl	5,090	1,907
Neoprene	343,859	126,887
Nitrile	232,879	106,280
"Thiokol"	2,600	1,502
Polyisobutylene	11,920	3,859
Other	2,078	1,580
Reclaimed rubber	2,267,380	177,060
Scrap rubber	2,753,084	101,963
TOTALS	5,964,795	$661,356
MANUFACTURED		
Rubber cement . . . *gals.*	49,600	$59,842
Rubberized fabric: auto cloth . . . *sq. yds.*	4,183	6,680
Piece goods and hospital sheeting . . . *sq. yds.*	104,283	80,697
Footwear: boots . . . *prs.*	20,524	107,104
Shoes . . . *prs.*	6,967	11,270
Rubber-soled canvas shoes . . . *prs.*	22,357	30,484
Soles . . . *doz. prs.*	34,306	79,623
Heels . . . *doz. prs.*	39,271	51,472
Rubber soling and toplift sheets . . . *lbs.*	100,969	20,031
Gloves and mittens . . . *doz. prs.*	8,930	37,792
Drug sundries: water bottles and fountain syringes . . . *no.*	27,406	16,014
Other	.....	173,315
Rubber and rubberized clothing	.....	101,723
Balloons	.....	45,189
Toys and balls	.....	32,152
Erasers . . . *lbs.*	18,349	11,983
Hard rubber goods: battery boxes . . . *no.*	47,891	58,724
Other electrical goods . . . *lbs.*	141,577	80,038
Combs, finished . . . *doz.*	1,320	2,380
Other	.....	9,259
Tire casings: truck and bus . . . *no.*	82,328	3,597,615
Auto . . . *no.*	35,820	454,173
Tire and casings: aircraft . . . *no.*	2,644	136,518
Tire casings: farm tractor . . . *no.*	28,845	411,733
Other off-the-road . . . *no.*	5,206	353,292
Tires and casings:		
Bicycle . . . *no.*	10,106	10,121
Motorcycle . . . *no.*	560	3,932
Other . . . *no.*	2,492	42,943
Inner tubes: auto, truck, bus . . . *no.*	109,642	402,127
Other . . . *no.*	35,954	136,655
Solid tires: truck, industrial . . . *no.*	2,952	92,056
Other . . . *lbs.*	2,808	1,511
Tire repair materials: camelback . . . *lbs.*	106,360	29,699
Other . . . *lbs.*	160,208	101,247
Rubber and friction tape . . . *lbs.*	45,102	35,874
Belting: auto, home . . . *lbs.*	105,345	125,777
Transmission: V-belts . . . *lbs.*	132,135	212,417
Flat belts . . . *lbs.*	67,761	72,010
Other . . . *lbs.*	34,463	37,063
Conveyer and levitator . . . *lbs.*	116,047	90,074
Other . . . *lbs.*	108,600	100,376
Hose and tubing . . . *lbs.*	718,788	520,023
Rubber packing . . . *lbs.*	151,663	140,898
Mats, flooring, tiling . . . *lbs.*	915,633	222,283
Rubber thread: bare . . . *lbs.*	54,328	96,215
Textile covered . . . *lbs.*	7,816	19,611
Gutta percha products . . . *lbs.*	8,611	11,124
Latex and other compounded rubber for further manufacture . . . *lbs.*	303,512	121,993
Other natural and synthetic rubber products	.....	356,047
TOTALS	.....	$8,951,179
GRAND TOTALS, ALL RUBBER EXPORTS	.....	$9,612,535
Reexports of Foreign Merchandise		
UNMANUFACTURED, Lbs.		
Crude rubber	972,460	$211,323
Balata	11,902	8,794
Butyl	5,000	998
TOTALS	989,362	$221,115
MANUFACTURED		
Rubber toys and balls	.....	$106
Erasers . . . *lbs.*	2,024	667
Tire casings: truck and bus . . . *no.*	4	389
Auto . . . *no.*	50	350
Rubber packing . . . *lbs.*	1,289	707
Other natural and synthetic rubber goods	.....	4,484
TOTALS	.....	$6,703
GRAND TOTALS, ALL RUBBER REEXPORTS	.....	$227,818

SOURCE: Bureau of Census, United States Department of Commerce, Washington, D. C.

Rims Approved and Branded by The Tire & Rim Association, Inc.

RIM SIZE	Apr., 1949
15" & 16" D. C. Passenger	
15x3.30D	16,762
16x4.00E	120,493
15x4.50E	14,706
16x4.50E	190,174
15x5.00E	16,178
16x5.00F	31,748
15x5.50F	40,636
16x5.50F	14,222
16x6.00F	8,627
16x4.00E—Hump	8,163
16x4.50E—Hump	15,939
15x4½-K	44,112
16x4½-K	122,411
15x5-K	570,183
15x5½-K	304,987
15x6-L	120,586
16x6-L	5,498
15x6½-L	136,662
15x4½-K—Hump	293,804
15x5-K—Hump	86,150
15x5½-K—Hump	95,402
15x6-L	14,224
17" & Over	
18x2.00BB	2,011
18x2.15B	2,980
Truck-Bus	
15x5.0	738
17x5.0	22,032
18x5.0	25
20x5.0	19,535
17x5.00R	5,847
20x5.00R	10,503
15x5.00S	60
20x5.00S	15,852
17x5.5	28,381
15x5.50S	821
20x5.50S	9,883
20x6.0	81,904
20x6.00S	61,657
15x6.00T	65
18x6.00T	52
20x6.00T	5,732
20x6.5	749
15x6.50T	722
18x6.50T	468
20x6.50T	4,560
22x6.50T	612
20x7.0	2,224
20x7.00T	8,005
20x7.33V	1,986
22x7.33V	2,526
24x7.33V	175
20x7.5	3,968
22x7.5	7,402
20x7.50V	137
20x7.50V—Flat Base	5,666
22x7.50V	133
22x7.50V—Flat Base	183
24x7.50V—Flat Base	22
22x8.0	849
20x8.00V	3,135
22x8.00V	3,528
24x8.00V	240
20x8.37V	361
20x10.0	920
Semi D. C.	
15x5.50F	40,053
16x5.50F	10,932
Tractor & Implement	
12x2.50C	5,540
12x3.00D	25,010
15x3.00D	25,471
18x3.00D	1,480
19x3.00D	23,746
21x3.00D	1,517
36x3.00D	6,152
40x3.00D	328
20x4.50E	7,872
36x4.50E	1,620
12x5.00JA	1,181
13x5.50F	1,676
18x5.50F	13,572
20x5.50F	11,125
24x5.50R	310
40x5.50R	1,747
20x8.00T—S. D. C.	754
24x8.00T—S. D. C.	7,540
28x8.00T—S. D. C.	539
36x8.00T—S. D. C.	430
W5-24	1,199
W7-24	3,223
W8-24	2,251
W8H-24	3,872
W8-34	2,308
W8-36	1,421
W9-24	1,673
W9-28	28,818
W9-36	1,982
W9-38	4,256
W10-24	834
W10 28	5,481
W10-36	345
W10-38	3,539
W11-38	2,831
DW9-38	8,084
DW10-38	12,947
DW11-24	959
WD11-28	679
DW11-38	10,097
DW12-26	746
DW12-30	4,469
DW12-34	2,499
Earth Mover	
24x13.00	196
24x15.00	70
25x15.00	107
29x17.00	105
Industrial	
4x2.50C	76
9x4.00E	207
10x5.00F	220
12x5.00S	33
TOTAL	2,882,438

Foreign Trade Opportunities

The firms and individuals listed below have recently expressed their interest in buying in the United States or in United States representations. Additional information concerning each import or export opportunity, including a World Trade Directory Report, is available to qualified United States firms and may be obtained upon inquiry from the Commercial Intelligence Unit of the United States Department of Commerce, Washington, D. C., or through its field offices, for $1 each. Interested United States companies should correspond directly with the concerns listed concerning any projected business arrangements.

Export Opportunities

J. A. Linden, N. V. i. o., 104 Westzeedijk, Rotterdam, Netherlands: surgical and hospital supplies.

Javier Cortes Fernandez, Apartado 25, Alajuela, Costa Rica: plastic powder.

"Vulca," 28 Veenkade, The Hague, Netherlands: used truck tires fit for recapping or retreading.

Oscar Baecker, Oberdenkmalstrasse 79, Wuppertal-Barmen, Germany: rubber elastic threads.

Georg Meier, Richthofenstrasse 4, München, Obermenzing, Germany: tires.

CLASSIFIED ADVERTISEMENTS
Continued

SITUATIONS OPEN (Continued)

PLASTIC ENGINEER WANTED: MECHANICAL ENGINEER preferred. Must have experience on molding of clutch facings, mold design, and plant operation. Give full résumé of experience, references, and salary desired. Address Box No. 370, care of INDIA RUBBER WORLD.

CHEMISTS AND ENGINEERS: A WELL-ESTABLISHED, nationally known and financially responsible concern is planning to manufacture a product involving pressure-sensitive adhesives. Men with experience in tape preferred, as many of the problems involved will bear a direct relation to tape. An excellent opportunity for men who can fulfill requirements and are willing to take the responsibility of getting a new division going at top speed. The organization will build up as fast as possible, but the leader selected would have an opportunity to build his own organization. Replies will be confidential and handled by top management of company. Salaries to be commensurate with ability and experience of individuals selected. Give experience, references, professional and personal information. Address Box No. 374, care of INDIA RUBBER WORLD.

HELP WANTED—PRODUCTION SUPERINTENDENT WITH EXperience in hard rubber. Located in Chicago area. Please send complete résumé to Box 379, care of INDIA RUBEER WORLD.

MACHINERY & SUPPLIES WANTED

WANTED: COMPLETE RUBBER PLANTS. ALSO INDIVIDUAL items such as 2-roll mills, calenders, mixers and Banbury mixers. Address Box No. 372, care of INDIA RUBBER WORLD.

WANTED: EITHER A COMPLETE PLANT OR INDIVIDUAL machines for manufacturing rubber products. Address Box No. 376, care of INDIA RUBBER WORLD.

WANTED: MOONEY PLASTOMETER. ADDRESS BOX NO. 382, care of INDIA RUBBER WORLD.

MACHINERY & SUPPLIES FOR SALE

FOR SALE: 1—WATSON STILLMAN LOW AND HIGH HYDRO-Pneumatic Accumulator (3000#) pressure with pumps, motors, and accessories. 1—48 x 48" 3-opening Hydraulic Press with 4-16" rams; other presses, various sizes. 1—6' x 24' Vulcanizer, 100# pressure, quick-opening door. 6—Royle and other Tubers 2⅛ to 8". Also mills, calenders, etc. Send us your inquiries. CONSOLIDATED PRODUCTS CO., INC., 13-16 PARK ROW, NEW YORK 7, NEW YORK. Telephone BArclay 7-0600.

EQUIPMENT FOR SALE: 14 OIL HYDRAULIC UNITS 500# LOW 2000# Hi-Pressure Pumps 50 and 65 gal. reservoir, 5 to 10 H.P. Motors, complete with all operating valves. All in good operating condition. For use with rubber or plastic presses. YALE RUBBER MFG. CO., SANDUSKY, MICHIGAN.

FOR SALE—16 X 42" RUBBER MILL, MOTOR AND CONTROLS. 22 gpm triplex pump; 2 Oilgear pumps and motors. 15 HP automatic high pressure boiler. Like new. GRANT ENGINEERING COMPANY, 2640 Prairie Ave., Chicago 16.

EXCEPTIONAL OFFERINGS IN
Used Rubber & Plastic Equipment
Special Farrel 3-Roll Stock and Friction Type 18" x 54" Calender; other Calenders by Thropp, Farrel in 2- and 3-Roll Calenders from 14" x 42" to 22" x 66". 15 Rubber and Plastic Mixing-Refining-Converting Mills from 6" x 12" to 24" x 84". 12 Extruders, Tubers, Strainers by Royle, Adamson, National, Housatonic, Allen from 2" to 10". 32 Heavy-Duty Tablet Presses: Stokes "R," "T," and Colton 5½, 9AT.; Kux 60, 74 and others. 8 Horizontal Vulcanizers from 6' to 30' long. One Taylor-Stiles Giant Tire Chopper. One Sargent 3-Pass Conveyer-Type Rubber Drier. FIRST MACHINERY CORP., 157 Hudson St., New York 13, N. Y.

FOR SALE: 1—DAY MOGAL-TYPE MIXER, SIZE 5. 1—EEMCO lab. 2-roll rubber mill, 6" x 12". 1—#1 Royle extruder. Address Box No. 373, care of INDIA RUBBER WORLD.

FOR SALE: NEW EQUIPMENT—STRIP FEED & COOLING CONveyers. Batch makeup feed conveyers. Latex and cement mixers. Pneumatic syphon for latex and other liquids. THE JAMES F. MUMPER CO., 313 Everett Bldg., Akron 8, Ohio.

READY, COMPLETELY REBUILT #9 BANBURY MIXER bodies, spray or jacketed, exchange for worn bodies and save time. All sizes rebuilt to order. INTERSTATE WELDING SERVICE, 914 Miami Street, Akron 11, Ohio.

We offer 18,500 aluminum, standard sizes, toy balloon forms.
Mounted on thirty-five inch channels.
Round Type, sizes 5, 6, 7, 8, 9 and 11.
Airship Type, numbers 312, 318, 426 and 524.
If interested will be pleased to give further details, prices, etc. Will also export pack and ship if so desired.

Horace Rubber Products Co., Inc.
588 Broadway New York 12, New York

Representative Wanted

To sell equipment and material to the rubber industry, including tire manufacturers. Write fully the territory you now cover, the product you now carry, and such general information which will lead to an interview.

REPLY FULLY TO

Box No. 363, care of INDIA RUBBER WORLD

(Classified Advertisements Continued on Page 403)

Malayan Rubber Statistics

The following statistics for February, 1949, have been received from Singapore by way of Malaya House, 57 Trafalgar Square, London, W. C. 2, England.

Ocean Shipments from Singapore and Malayan Union—In Tons

To	Sheet and Crepe: Singapore Export Proper	Sheet and Crepe: Malayan Union: Trans-shipped	Sheet and Crepe: Malayan Union: Direct Shipments	Latex, Concentrated Latex, and Revertex (Dry Rubber Content): Singapore Export Proper	Latex: Malayan Union: Trans-shipped	Latex: Malayan Union: Direct Shipments	Total All Grades Jan.-Feb 1949
Argentine Republic	2	29	...	6	...	...	96
Australia	1,515	293	495	25	76	...	3,574
Austria	...	...	...	...	...	...	5
Belgium	88	14	259	1	3	...	1,594
Bulgaria	...	...	...	...	...	...	342
Burma	...	...	1,011	...	...	...	2,423
Canada	1,548	255	1,512	...	...	...	6,884
Chile	7	...	...	5	...	...	49
China	551	...	45	...	...	...	601
Cuba	125	...	25	...	...	...	150
Cyprus	1	...	...	...	...	...	5
Czechoslovakia	205	...	...	...	...	...	205
Denmark	286	189	40	4	2	...	873
Egypt	5	...	...	...	6	...	35
France	2,344	222	2,228	228	38	106	9,846
Germany	2,476	535	3,238	60	...	27	14,545
Hong Kong	623	9	187	...	...	...	1,634
Italy	1,077	590	778	4	124	33	5,492
Japan	1,665	9	2,009	21	...	...	6,883
Korea	20	...	...	...	...	...	20
Mexico	661	25	75	...	...	...	861
Netherlands	1,265	220	2,475	22	12	...	13,609
New Zealand	167	...	40	...	1	...	208
Norway	415	...	76	...	1	...	687
Other British countries in Africa	2	...	...	...	...	...	1
Countries in North America	...	...	...	...	...	...	2
Countries in South America	100	...	170	...	...	...	375
Pakistan	1	...	...	...	...	...	4
Peru	7	29	13	...	...	...	49
Philippine Islands	25	...	...	...	...	...	26
Poland	232	40	...	...	...	...	522
Portugal	176	75	30	...	...	...	409
Portugese East Africa	...	...	...	...	...	...	5
Rumania	...	...	...	...	...	...	275
Russia	5,525	...	3,827	...	...	...	1,3004
Spain	...	...	11	...	...	...	11
Sweden	220	82	356	6	...	...	1,268
Switzerland	70	...	...	...	...	...	120
Syria	1	...	...	...	...	...	4
Turkey	15	15	30	...	...	...	615
Union of India	...	...	45	...	...	...	446
Union of South Africa	1,583	353	436	19	18	2	4,679
United Kingdom	4,758	1,769	6,361	646	14	74	31,580
U. S. A.	9,109	1,019	9,606	725	...	968	50,844
TOTAL	36,870	5,772	35,378	1,772	295	1,210	174,860

Foreign Imports of Rubber in Long Tons

Singapore Imports from	Dry Rubber	Wet Rubber (Dry Weight)
Banka and Billeton	422	...
Brunei	161	2
Burma	7	8
Celebas and Moluccas	3	...
Dutch Borneo	1,192	577
Java	*34	10
North Borneo	910	52
Other countries in Asia	30	2
Dutch Islands	60	7
Rhio Residency	668	14
Sarawak	2,364	41
Sumatra	3,569	1,960
Total	9,480	2,673

*Includes 17 tons sole crepe.

Federation of Malayan Imports from		
Burma	582	61
Siam	2,490	...
Sumatra	703	341
United Kingdom	†5	...
TOTAL	3,780	402

†Returned by London buyers.

Dealers' Stocks

	Tons
Penang and Province Wellesley	10,296
Singapore	37,633
TOTAL	47,929

Port Stocks in Private Lighters and Railway Godowns

Penang and Province Wellesley	4,546
Port Dickson	9
Port Swettenham	677
Singapore	17,258
Teluk Anson	443
TOTAL	22,933

Production

Estates	27,593
Small holdings (estimated)	17,045
Total	44,638

Trade Marks

(*Continued from page 376*)

507,355. **StayLastic.** Elastic fabric. Continental Elastic Corp., New Bedford, Mass.

507,356. Representation of a rectangle containing a fanciful figure and the word: **"StayLastic."** Elastic fabrics. Continental Elastic Corp., New Bedford, Mass.

507,470. **Natural Form.** Brassieres, girdles, and corselets. J. Cerrato, doing business as Natural Form Brassiere Co., Perth Amboy, N. J.

507,473. **Sturdi-Lite.** Crib mattress covers. I. B. Kleinert Rubber Co., Inc., New York, N. Y.

507,476. Representation of a woman and the words: **"Super-Duds."** Infants' rubber pants. Rice & Breskin, New York, N. Y.

507,515. **Darex.** Base composition for coating, impregnating, etc. Dewey & Almy Chemical Co., Cambridge, Mass.

507,572. **Cured Cover.** Golf balls. Worthington Ball Co., Elyria, O.

507,591. **Branick.** Tire tools and tire handling apparatus. Branick Mfg. Co., Inc., Fargo, N. D.

507,610. **Wheels of Progress.** Grinding, abrading, etc., wheels. Bay State Abrasive Products Co., Westboro, Mass

507,628. **Gates.** Electric storage batteries and casings. Gates Rubber Co., Denver, Colo.

507,637. **Air-Flite.** Golf balls, basketballs, volley balls, etc. A. G. Spalding & Bros., Inc., Chicopee, Mass.

507,647. **Eagle.** Golf balls and clubs. A. G. Spalding & Bros., Inc., Chicopee, Mass.

507,674. **Dot.** Golf balls and tennis balls. A. G. Spaulding & Bros. Inc., Chicopee, Mass.

507,676. **Roeplastic.** Wire and cable. John A. Roebling's Sons Co., Trenton, N. J.

507,684. Representation of a polar bear and the words: **"Polar Grip."** Tire treads and camelback. Firestone Tire & Rubber Co., Akron, O.

507,703. Representation of a walnut and the words: **"Old Walnut."** Hydraulic brake fluid. J. F. McLeod, doing business as McLeod Rubber Co., Hendersonville, N. C.

507,729. **Snow-White.** Cement. Van Cleef Bros., Chicago, Ill.

507,749. **Char-Lynn.** Tire spreaders. Char-Lynn Co., Minneapolis, Minn.

507,751. Representation of a circle containing the words: **"Magnet Wire Incorporated,"** and an inner circle containing a representation of motor and a coil. Insulated wire. Magnet Wire Inc., New York, N. Y.

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, Inventory, March, February, 1949; First Three Months, 1949, 1948

	March, 1949	% of Change from Preceding Month	February, 1949	First Three Months, 1949	First Three Months, 1948
Passenger Casings					
Shipments					
Original equipment	2,155,649		1,819,103	5,880,364	5,303,421
Replacement	2,692,843		2,086,124	7,080,886	7,803,045
Export	49,477		31,263	122,145	206,855
TOTAL	4,897,869	+24,42	3,936,490	13,083,395	13,131,321
Production	5,361,336	+12.11	*4,782,309	14,915,761	17,225,001
Inventory end of month	10,669,721	+ 4.81	*10,180,130	10,669,721	9,304,292
Truck and Bus Casings					
Shipments					
Original equipment	362,999		352,696	1,114,048	1,410,971
Replacement	536,375		*502,474	1,591,712	1,707,858
Export	105,345		73,908	264,404	298,152
TOTAL	1,004,719	+ 8.14	*929,078	2,970,164	3,416,981
Production	1,216,167	+ 9.71	*1,108,523	3,448,510	3,945,173
Inventory end of month	2,420,855	+ 9.77	*2,205,330	2,420,855	2,053,005
Total Automotive Casings					
Shipments					
Original equipment	2,518,648		2,171,799	6,994,412	6,714,392
Replacement	3,229,218		*2,588,598	8,672,598	9,510,903
Export	154,722		105,171	386,549	505,007
TOTAL	5,902,588	+21.31	*4,865,568	16,053,559	16,730,302
Production	6,577,503	+11.66	*5,890,832	18,364,271	21,170,174
Inventory end of month	13,090,576	+ 5.69	*12,385,460	13,090,576	11,357,297
Passenger and Bus and Truck Tubes					
Shipments					
Original equipment	2,513,481		2,168,011	6,979,315	6,706,876
Replacement	2,565,115		*2,162,203	7,258,385	7,661,686
Export	95,176		75,958	267,791	281,756
TOTAL	5,173,772	+17.42	*4,406,172	14,505,491	14,650,318
Production	5,947,598	+20.84	4,921,766	15,931,721	16,724,970
Inventory end of month	11,230,827	+ 7.55	*10,442,118	11,230,827	9,916,913

*Revised.
NOTE: Cumulative data on this report include adjustments made in prior months.

CLASSIFIED ADVERTISEMENTS

Continued

MACHINERY & SUPPLIES FOR SALE (Cont'd)

FOR SALE: FARREL 18" X 45", 16" X 48", 15" X 36" 2-ROLL RUBber Mills, also new Lab. 6" x 12" & other sizes up to 84"; Rubber Calenders; Extruders 2" to 6"; Ball & Jewell Rotary Cutters 40 HP & 5 HP; Baker Perkins 200 gal. & 100 gal. double arm, jack. Mixers, also 9 and lab. 0.7 gals.; Large stock Hydraulic Presses from 12" x 12" to 42" x 48" platens, from 50 to 1500 tons; Hydraulic Pumps & Accumulators; Injection Molding Machines 1 to 16 oz.; Stokes & Colton single punch & rotary preform Tablet Machines, ½" to 2½"; Banbury Mixers; Grinders & Crushers, etc. SEND FOR SPECIAL BULLETIN. WE BUY YOUR SURPLUS MACHINERY. STEIN EQUIPMENT COMPANY, 90 WEST STREET, NEW YORK 6, N. Y.

FOR SALE: #49 BANBURY MIXER COMPLETE, WITH OR without motor and control. Has been completely rebuilt. Write or wire INTERSTATE WELDING SERVICE, 914 Miami Street, Akron 11, Ohio.

2—F.B. 22" X 60" COMPOUNDING MILLS WITH DRIVES AND motors. 1—#3A Banbury mixer. 1—#3 Banbury mixer. 1—Watson-Stillman high & low pressure hydro-pneu. Accumulator System. 1—Thropp 6" x 16" lab. mill, motor & drive. 1—Readco 3 quart, jacketed mixer with exp. prf. AC motor. Hydraulic presses from lab. size to platen sizes, 50" x 100". 10—Royle, Allen & National tubers & extruders, up to 10" dia. worms. 1—F.B. 18" x 48" 3-roll, stock & friction calender, complete with herringbone gears. EAGLE INDUSTRIES, INC., 110 Washington St., New York 6, N. Y. DIgby 4-8364-5-6.

FOR SALE: 18" X 42" 2-ROLL FARREL RUBBER MILL, WITH 50 H.P. motor and reduction gear, starting box, etc. 42" Walker Turner Splitter with 15 H.P. motor; V-Belt Drive, latest model; 1 Hot Air-Curing Oven, 19 shelves 40" x 48" with all electric equipment. One 52" Lightning Sender with motor. All equipment in perfect condition. May be seen in working operation or completely taken over manufacturing of rubber platforms. Address Box No. 380, care of INDIA RUBBER WORLD.

W & P 100-GAL. JKTD. MIXER; B-P 15 GAL. VAC. JKTD. MIXER; Read 250 gal. jktd mixer, Stokes rotary 16-punch presses. PERRY EQUIPMENT CORP., 1524 W. Thompson St., Phila. 21, Pa.

FOR SALE: 4-INCH ADAMSON EXTRUDER, ALSO 40-INCH vulcanizer with 48-inch bolted door. FALCO SUPPLY CO., 324 Main St., Charlestown, Mass.

FINANCIAL

American Cyanamid Co., New York, N. Y., and subsidiaries. First three months, 1949: net income, $4,131,109, equal to $1.51 a common share, compared with $2,910,803, or $1.06 a share, the year before; net sales, $57,781,559, against $55,614,992.

American Zinc, Lead & Smelting Co., Columbus, O., and wholly owned subsidiaries. First quarter, 1949: net profit, $391,095, equal to 45¢ a share, against $142,267, or 8¢ a share, in the 1948 period; net sales, $10,099,713, against $9,999,692.

Baldwin Locomotive Works, Philadelphia, Pa., and wholly owned subsidiaries. First quarter, 1949: net profit, $918,635, equal to 37¢ each on 2,375,553 common shares, against $670,000, or 26¢ a share, in the 1949 quarter; sales, $31,380,168, against $29,488,373; income taxes, $735,000, against $425,000.

Belden Mfg. Co., Chicago, Ill. January 1-March 31, 1949: net profit, $157,301, equal to 49¢ a share, against $174,909, or 54¢ a share, in the 1948 months.

Brunswick-Balke-Collender Co., Chicago, Ill., and subsidiaries. First three months, 1949: net loss, $53,732, compared with net profit of $62,406 a year ago; net sales, $4,892,206, against $5,305,711.

Crown Cork & Seal Co., Inc., Baltimore, Md. For 1948: net income, $4,515,113, equal to $3.28 each on 1,207,790 common shares, compared with $4,178,317, or $3 a share, in 1947; sales, $98,628,485 (a new high), against $81,438,684.

March quarter: net profit, $523,439, equal to 32¢ a share, compared with $1,651,000, or $1.25 a share, in the same period last year; net sales, $19,944,403, against $23,089,958; federal income tax, $342,900, against $1,038,075.

Denman Tire & Rubber Co., Warren, O. For 1948: net profit, $12,547, equal to 32¢ a preferred share, against $282,062, or $1.32 a share, in 1947; net sales, $2,131,019, against $3,734,522.

Detroit Gasket & Mfg. Co., Detroit, Mich. For 1948: net profit, $1,363,923, equal to $2.60 a share, against $937,075, or $1.78 a share, in 1947.

DeVilbiss Co., Toledo, O., and wholly owned subsidiary. First quarter, 1949: net income, $96,838, equal to 32¢ each on 300,000 common shares, contrasted with $136,779, or 45¢ a share, in the '48 quarter; provision for federal taxes, $95,174, against $77,373.

General Cable Corp., New York, N. Y. Three months ended March 31: net income, $785,845, equal to 40¢ a share, against $1,072,799, or 46¢ a share, the year before.

Gro-Cord Rubber Co., Lima, O. For 1948: net income, $143,682, equal to $1.31 a common share, against $61,526, or 56¢ a share, in the preceding year.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Quarter ended March 31: net income, $43,581,325, equal to $3.65 a share, against $30,195,371, or $2.46 a share, in the first quarter of the preceding year; net sales, $249,484,587, against $220,114,551; provision for taxes, $1,060,000, against $730,000.

Hercules Powder Co., Wilmington, Del. Quarter ended March 31: net earnings, $2,501,690, equal to 90¢ each on 2,644,789 common shares, against $2,975,181, or $1.09 each on 2,633,420 shares, in the like months last year; net sales, $30,168,730, against $33,984,525.

Intercontinental Rubber Co., Inc., New York, N. Y., and subsidiaries. For 1948: net loss, $1,283,338, against loss of $354,063 in 1947; sales of guayule rubber, $138,576, against $1,357,033; current assets, including $210,254 cash, $906,584, current liabilities, $12,640, against $281,550, $1,268,409, and $48,338, respectively, the end of 1947.

Jenkins Bros., Bridgeport, Conn. For 1948; net income, $388,367, equal to $2.78 a common share, against $836,027, or $6.39 a share, in 1947; sales, $10,388,590, against $10,247,037.

I. B. Kleinert Rubber Co., New York, N. Y., and subsidiaries. For 1948: net profit, $354,682, equal to $2.22 each on 159,714 capital shares, against $424,258, or $2.65 each on 159,814 shares, in 1947; net sales, $8,743,235, against $8,173,463.

Mansfield Tire & Rubber Co., Mansfield, O. For 1948: net income, $1,327,046, equal to $8.12 a common share, against $1,965,483, or $12.13 a share, in the previous year; net sales, $28,669,983, against $40,499,826.

Norwalk Tire & Rubber Co., Norwalk, Conn. Six months to March 31: net loss, $19,522, against net loss of $29,736 in the corresponding period last year; sales, $3,073,983, against $3,402194.

O'Sullivan Rubber Corp., Winchester, Va. For 1948: net income, $83,206, equal to 12¢ each on 389,483 common shares, against net loss of $168,321 in 1947; net sales, $3,026,190, against $4,984,940.

Servus Rubber Co., Rock Island, Ill. Year ended February 28, 1949. Net income, $247,961, equal to 65¢ a common share, against $375,209, or 98¢ a share, in the preceding fiscal year.

Thermoid Co., Trenton, N. J., and subsidiaries. For 1948: net income, $1,040,469, equal to $1.20 each on 752,366 common shares, contrasted with $963,468, or $1.21 each on 682,464 shares, the year before; net sales, $23,628,913, against $22,677,652; income taxes, $731,528, against $788,329; current assets, including $1,041,701 cash, $8,935,349, current liabilities, $4,407,456, against $1,159,117, $8,594,105, and $4,504,915, respectively, on December 31, 1947.

First quarter, 1949: net profit, $279,139, equal to 32¢ each on 752,366 common shares, against $284,974, or 35¢ each on 716,588 shares in the 1948 quarter; gross sales, $5,822,311, against $5,966,474; reserve for income taxes, $168,987, against $184,057.

Thiokol Corp., Trenton, N. J. Year ended December 31, 1948: net income, $52,371, against $99,780 the year before; net sales, $1,139,662, against $1,204,598; provision for federal income taxes, $29,369, against $37,000; current assets, including $289,242 cash, $871,702, current liabilities, $122,181, against $408,881, $760,264, and $100,849, respectively, on December 31, 1947.

Timken Roller Bearing Co., Canton, O. Three months to March 31: net profit, $2,945,137, equal to $1.22 a share, against $3,373,720, or $1.39 a share, in last year's quarter.

Whitney Blake Co., Hamden, Conn. For 1948: net income, $10,759, equal to 5¢ a share, contrasted with $443,922, or $2.22 a share, in 1947; net sales, $4,564,723, against $6,242,729.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Belden Mfg. Co.	Com.	$0.30 q.	June 1	May 17
Brown Rubber Co., Inc.	Com.	0.25	June 1	May 18
Brunswick-Balke-Collender Co.	Com.	0.25 q.	June 15	June 1
	Pfd.	1.25 q.	July 1	June 20
Canadian Tire Corp., Ltd.	Com.	0.30 q.	June 1	May 20
	Com.	0.30 extra	June 1	May 20
Crown Cork & Seal Co., Inc.	Pfd.	0.50 q.	June 15	May 24
Crown Cork International	"A"	0.25 q.	July 1	June 10
Dunlop Rubber, Ltd.	ADR	3% extra	July 11	May 20
	ADR	12%	June 11	May 20
Endicott-Johnson Corp.	Com.	0.40	July 1	June 20
	4% Pfd.	1.00 q.	July 1	June 20
Flintkote Co.	Com.	0.50 q.	June 15	June 1
	Pfd.	1.00 q.	June 15	June 1
General Motors Corp.	Com.	1.25	June 10	May 12
	$5 Pfd.	1.25 q.	Aug. 1	July 11
	$3.75 Pfd.	0.93¾ q.	Aug. 1	July 11
General Tire & Rubber Co.	Com.	0.25 q.	May 31	May 20
B. F. Goodrich Co.	Com.	1.00	June 30	June 14
	Pfd.	1.25 q.	June 30	June 14
Hewitt-Robins, Inc.	Com.	0.25 q.	June 15	May 26
Johns-Manville Corp.	Com.	0.40	June 10	May 31
I. B. Kleinert Rubber Co.	Com.	0.25	June 10	May 25
Lea Fabrics, Inc.	Com.	0.37½	May 25	May 12
A. G. Spalding & Bros., Inc.	Com.	0.25 q.	July 8	June 15
Raybestos-Manhattan, Inc.	Com.	0.37½ q.	June 13	May 31
Tyer Rubber Co.	Com.	2.00	May 16	May 2
	$4.25 Pfd.	1.06¼ q.	May 16	May 2
United Elastic Corp.	Com.	0.75 q.	June 10	May 17
United States Rubber Co.	Com.	1.00	June 10	May 16
	Pfd.	2.00	June 10	May 16

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